

User / Integration Guide

Sona™ NX611 Modules

v0.3

Revision History

Version	Date	Notes	Contributors	Approver
0.1	23 March 2023	Preliminary version	Various	Andy Ross
0.2	11 June 2024	Ezurio branding.	Sue White	Dave Drogowski
0.3	06 August 2024	Updated Renderings with current labels and updated regulatory statements.	Brian Petted Pete Scharpf	Brian Petted

Contents

1	Introduction	4
2	SONA™ NX611 SIP Module	5
2.1	SONA™ NX611 SIP Module PCB Footprint	5
2.2	SONA™ NX611 SIP Module Mechanical Drawing	6
2.3	SONA™ NX611 SIP Module Pinout	7
3	SONA™ NX611 1216 Module	9
3.1	SONA™ NX611 M.2 1216 Module PCB Footprint	9
3.2	SONA™ NX611 M.2 1216 Module Mechanical Drawing	10
3.3	SONA™ NX611 M.2 1216 Module Pinout	11
4	SONA™ NX611 M.2 2230 Module	14
4.1	SONA™ NX611 M.2 2230 Module Mechanical Drawing	14
4.2	SONA™ NX611 M.2 2230 Module Pinout	15
5	FCC and ISED Modular Certification Requirements	17
5.1	Federal Communication Commission Interference Statement	17
5.2	Innovation, Science and Economic Development, Canada (ISED) Statement	19
6	Sona NX611 SIP Certified Module Host Board Requirements	21
7	SONA™ NX611 M.2 2230 Module Mounting Guidelines	23
8	Regulatory	24

1 Introduction

This document describes key hardware aspects of Laird Connectivity's Sona™NX611 Wi-Fi6 / Bluetooth 5.3 modules, which are based on NXP's IW611 chipset. It serves as a supplement to the full module datasheet and is provided to assist in initial hardware integration. This document also states the necessary conditions that need to be met in order to maintain the certification compliance in terms of physical end-product integration realization, end-product documentation regulatory statements, and labelling requirements.

The following are covered in this user / integration guide:

- **SONA™ NX611 SIP Module**
 - SONA™ NX611 SIP Module PCB Footprint
 - SONA™ NX611 SIP Module Mechanical Drawing
- **SONA™ NX611 1216 Module**
 - SONA™ NX611 M.2 1216 Module PCB Footprint
 - SONA™ NX611 M.2 1216 Module Mechanical Drawing
 - SONA™ NX611 M.2 1216 Module Pinout
- **SONA™ NX611 M.2 2230 Module**
 - SONA™ NX611 M.2 2230 Module Mechanical Drawing
 - SONA™ NX611 M.2 2230 Module Pinout
 - SONA™ NX611 M.2 2230 Module

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



Figure 1: Sona NX611 SIP Module



Figure 2: Sona NX611 M.2 1216 SMT Module

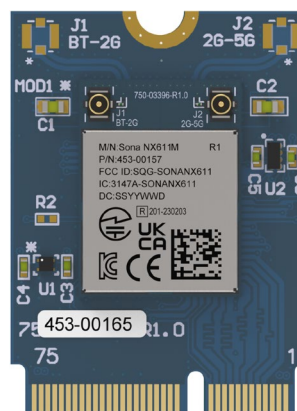


Figure 3: Sona NX611 M.2 2230 Module

2 SONA™ NX611 SIP Module

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

2.1 SONA™ NX611 SIP Module PCB Footprint

Module dimensions of the Sona NX611 SIP wireless module are 11 x 11 x 1.69 mm.

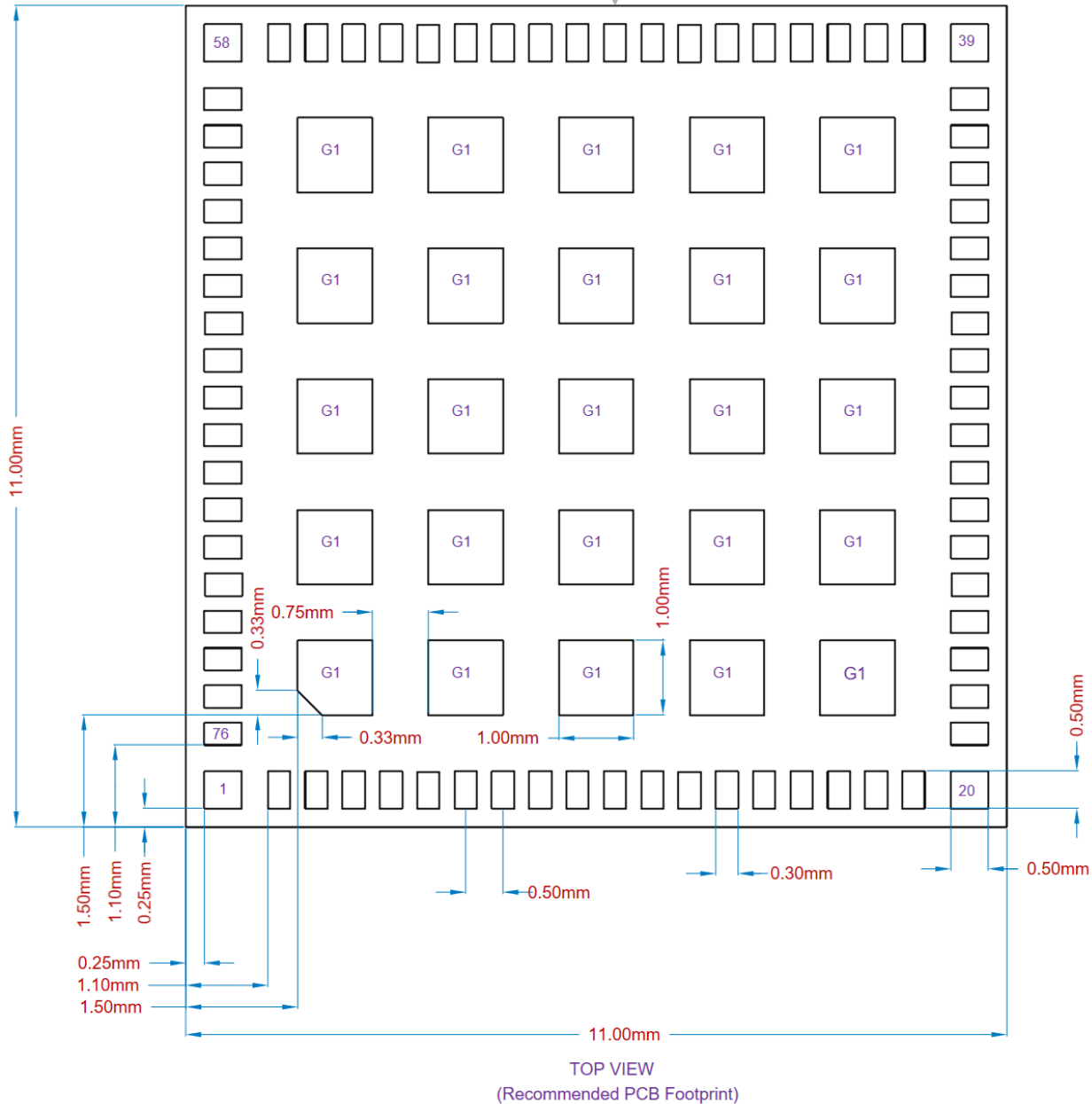


Figure 4: PCB Footprint (Bottom View) – NX611 SIP Module

2.2 SONA™ NX611 SIP Module Mechanical Drawing

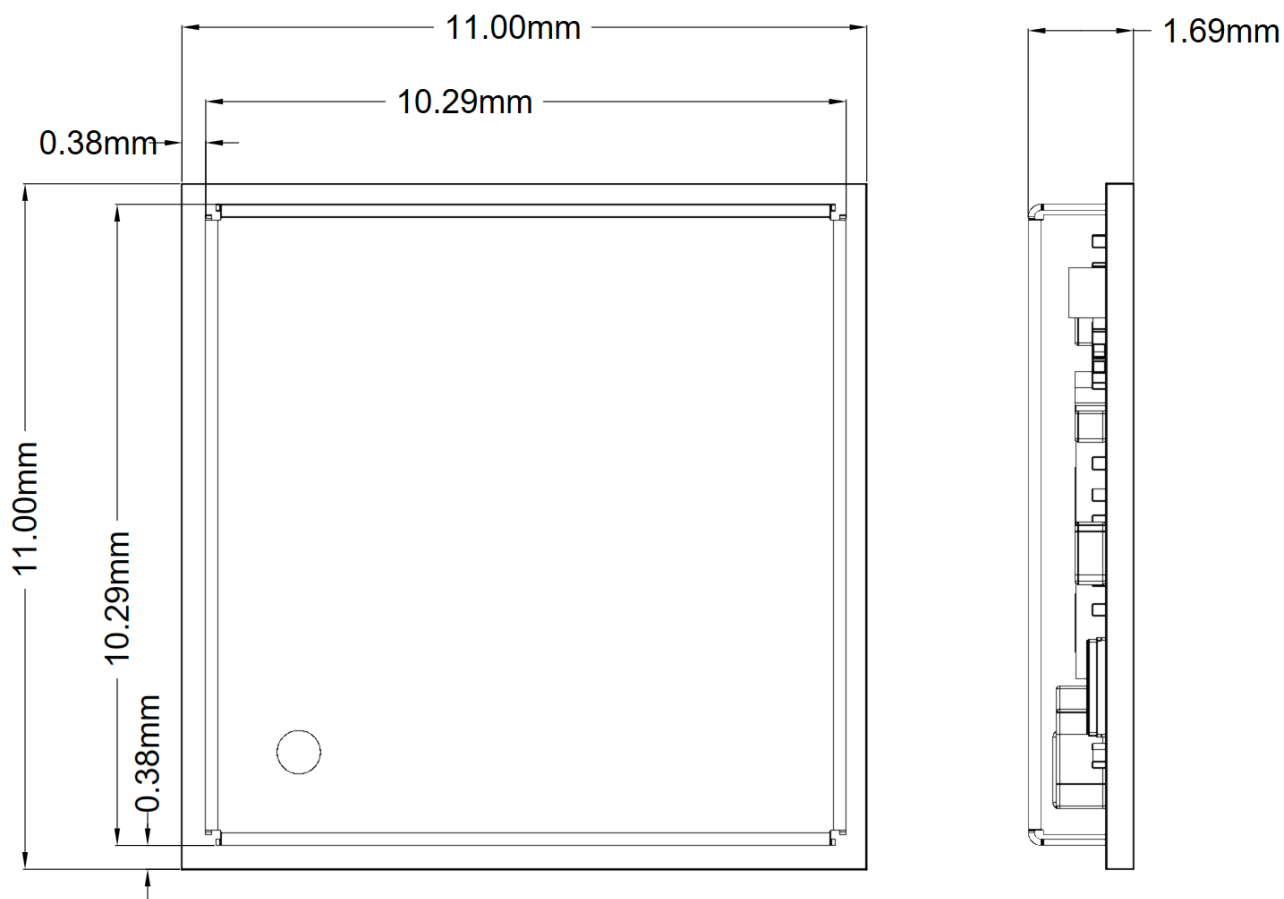


Figure 5: Mechanical Drawing – NX611 SIP module

Note: The Wi-Fi MAC address is located on the product label.

The last digit of Wi-Fi MAC address is assigned to either 0, 2, 4, 6, 8, A, C, E.

The Bluetooth MAC address is the Wi-Fi MAC address plus 1.

2.3 SONA™ NX611 SIP Module Pinout

Table 1: Sona NX611 SIP Module Pinout

Pin Number	Pin Name	Description	
1	GND	Ground	
2	VIO_SD	SDIO Power Supply	
3	GND	Ground	
4	SD_CMD	SD Command/response (input/output)	
5	SD_CLK	SD Clock input	
6	SD_DAT[1]	SD Data line bit[1]	
7	SD_DAT[3]	SD Data line bit[3]	
8	GND	Ground	
9	SD_DAT[2]	SD Data line bit[2]	
10	SD_DAT[0]	SD Data line bit[0]	
11	GPIO[21]/SD_INT	SDIO interrupt signal (output).	
12	BUCK_SENSE	Internal buck voltage. (for troubleshooting only)	
13	VIO	1.8V/3.3V digital I/O power supply	
14	GPIO[8]/UART_CTS	UART clear-to-send input signal (active low)	
15	GPIO[10]/UART_RX	UART serial input signal.	
16	GPIO[9]/UART_RTS	UART request-to-send output signal (active low).	
17	GPIO[11]/UART_TX	UART serial output signal.	
18	GPIO[13]/EXT_REQ	External radio request input signal (COEX)	
19	GPIO[12]/EXT_STATE	External radio state input signal (COEX)	
20	GND	Ground	
21	GPIO[14]/EXT_GNT	External radio grant output signal (COEX)	
22	GPIO[15]/EXT_PRI	External radio input priority signal (COEX)	
23	GPIO[0]/XOSC_EN	Oscillator enable (output)	
24	GPIO[20]/EXT_FREQ	External radio frequency input signal (COEX)	
25	CONFIG_HOST[1]	NC	
26	CONFIG_HOST[0]	NC	
27	GND	Ground	
28	GPIO[4]/PCM_CLK	PCM data clock (output if master, input if slave)	
29	GPIO[3]/PCM_MCLK	PCM clock output signal (optional)	
30	GPIO[5]/PCM_DOUT	PCM transmit data signal (output)	
31	GPIO[6]/PCM_DIN	PCM receive data signal (input)	
32	GPIO[7]/PCM_SYNC	PCM frame sync (output if master, input if slave)	
33	GPIO[2]/IND_RST_BT	Independent software reset for Bluetooth (input)	
34	GPIO[1]/IND_RST_WL	Independent software reset for Wi-Fi (input)	
35	GND	Ground	
36	AVDD18	1.8V analog power supply	Module has a weak 51K Ω Pull Up to 3.3V. For increased noise and ESD immunity, connect to host output pin.
37	AVDD18	1.8V analog power supply	
38	GND	Ground	
39	GND	Ground	

Pin Number	Pin Name	Description
40	PDn	Full Power-down (input) (active low)
41	GND	Ground
42	GND	Ground
43	GND	Ground
44	RF_TR_5	Wi-Fi transmit/receive (5 GHz)
45	GND	Ground
46	AVDD33	3.3V analog power supply
47	AVDD33	3.3V analog power supply
48	GND	Ground
49	GND	Ground
50	GND	Ground
51	GND	Ground
52	BRF_ANT	Bluetooth radio transmit/receive interface
53	GND	Ground
54	GND	Ground
55	GND	Ground
56	GPIO[26]/WCI-2_SOUT	Receive signal from external radio (input) (COEX)
57	GPIO[25]/WCI-2_SIN	Transmit signal to external radio (output) (COEX)
58	GND	Ground
59	RF_CNTL4	RF control line 4
60	RF_CNTL3	RF control line 3
61	RF_CNTL2	RF control line 2
62	RF_CNTL1	RF control line 1
63	RF_CNTL0	RF control line 0
64	GPIO[18]/BT_WAKE_IN	
65	GPIO[19]/BT_WAKE_OUT	Bluetooth wake-up signal (output).
66	GPIO[17]/WL_WAKE_OUT	Wi-Fi radio wake-up signal (output).
67	GPIO[16]/WL_WAKE_IN	Wi-Fi radio wake-up signal (input)
68	GND	Ground
69	GPIO[22]	I/O
70	GPIO[23]	I/O
71	GPIO[24]	I/O
72	GPIO[27]	I/O
73	GPIO[29]/JTAG_TMS	JTAG controller select (input)
74	GPIO[31]/JTAG_TDO	JTAG test data signal (output)
75	GPIO[28]/JTAG_TCK	JTAG test clock signal (input)
76	GPIO[30]/JTAG_TDI	JTAG test data signal (input)
G1	GND	Ground

3 SONA™ NX611 1216 Module

This section describes the hardware footprint, mechanical drawing and hardware pinout of the Sona NX611 M.2 1216 module. It provides details and pin assignments critical to hardware integration of the module.

3.1 SONA™ NX611 M.2 1216 Module PCB Footprint

Module dimensions of the Sona NX611 M.2 1216 wireless module are 12 x 16 x 1.72 mm.

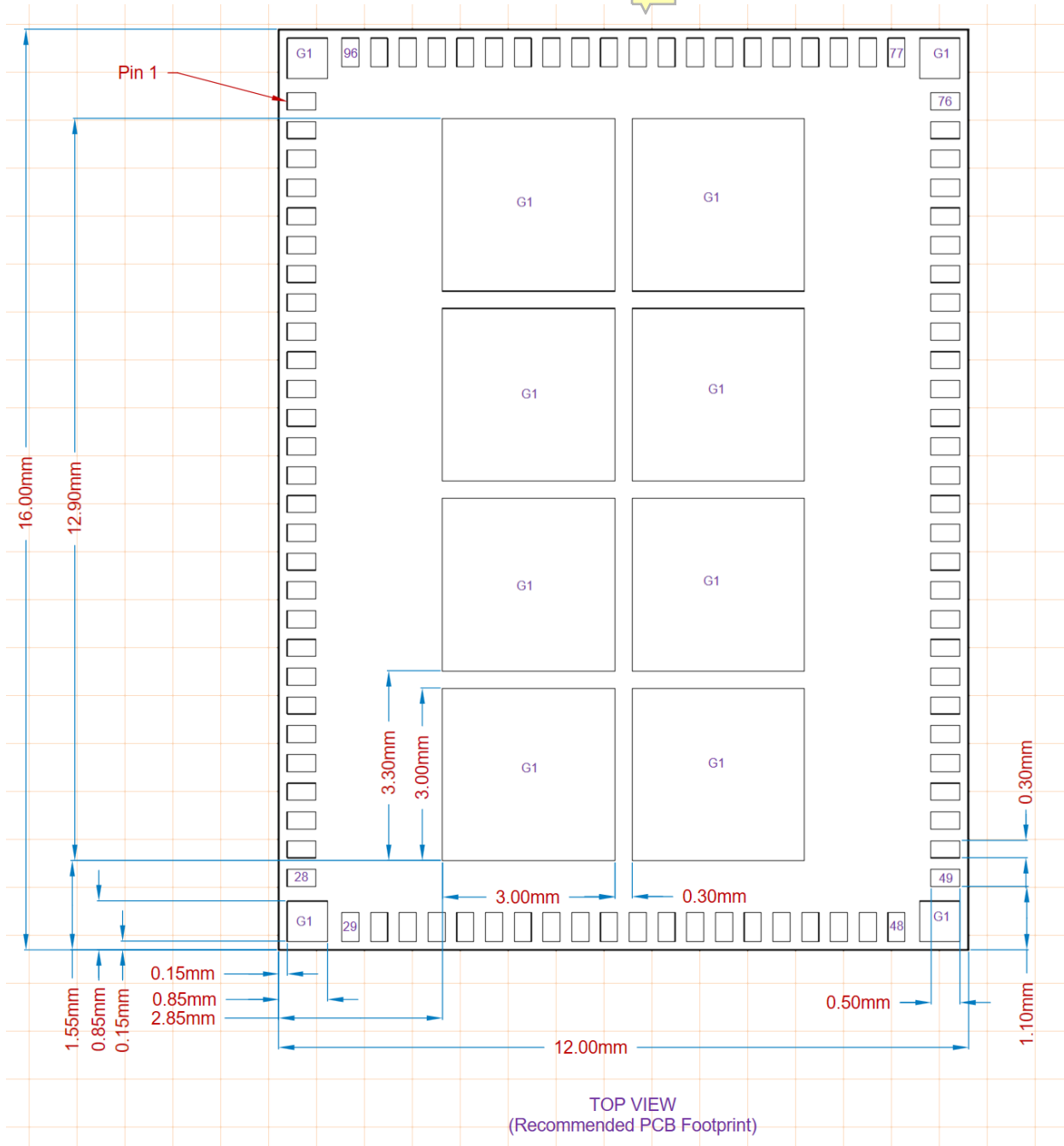


Figure 6: PCB Footprint (Bottom View) – NX611 M.2 1216 Module

3.2 SONA™ NX611 M.2 1216 Module Mechanical Drawing

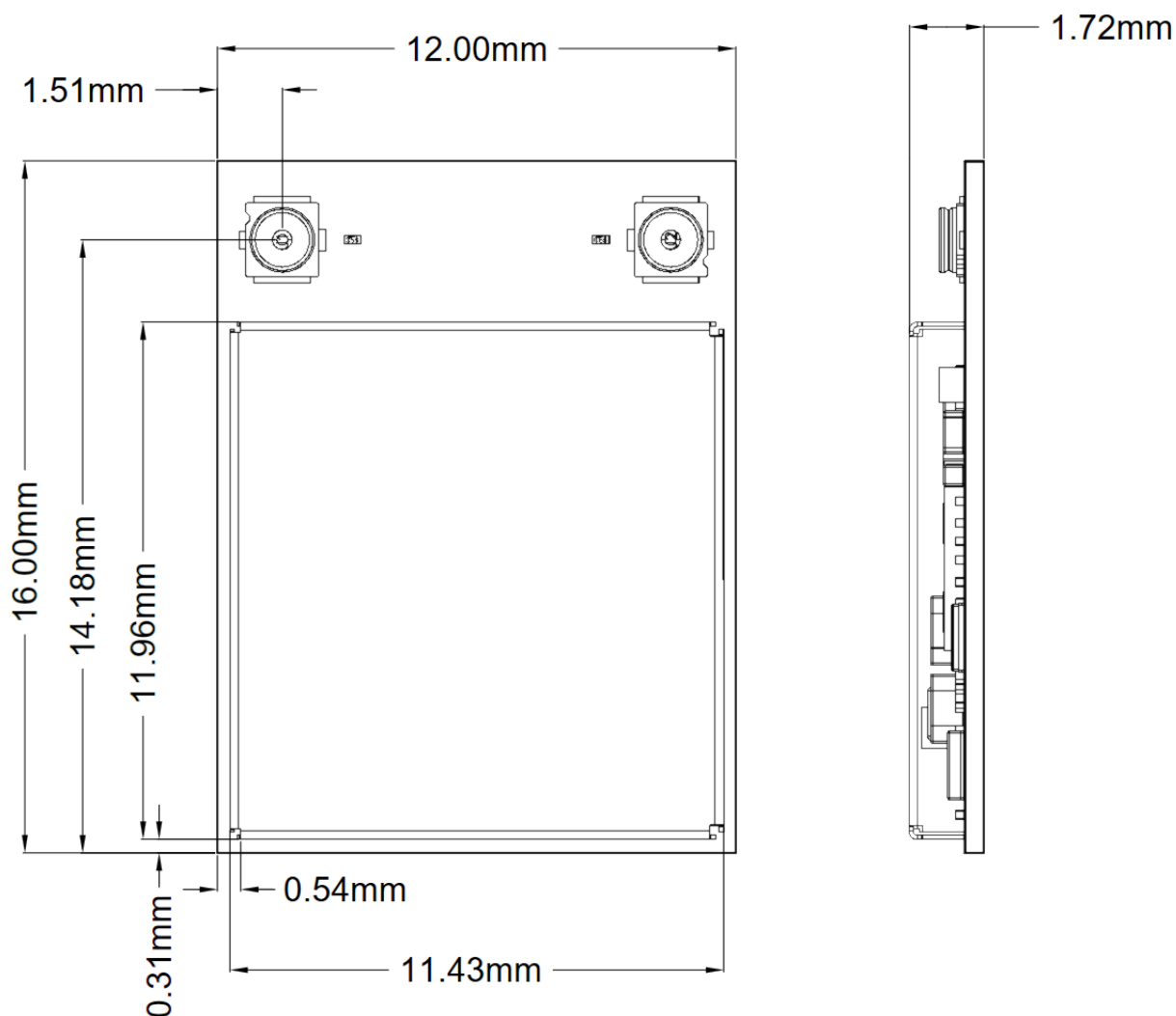


Figure 7: Mechanical Drawing – NX611 M.2 1216 module

Note: The Wi-Fi MAC address is located on the product label.

The last digit of Wi-Fi MAC address is assigned to either 0, 2, 4, 6, 8, A, C, E.

The Bluetooth MAC address is the Wi-Fi MAC address plus 1.

3.3 SONA™ NX611 M.2 1216 Module Pinout

Table 2: Sona NX611 M.2 1216 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	Module has a weak 51K Ω Pull Up to 3.3V. For increased noise and ESD immunity, connect to host output pin.
29	PEWAKE#	UNUSED	
30	CLKREQ#	UNUSED	
31	PERST#	UNUSED	
32	GND	Ground	Ground
33	REFCLKn0	UNUSED	
34	REFCLKp0	UNUSED	
35	GND	Ground	Ground

Pin Number	PCle M.2 Name	Pin Name NX611	Description
36	PETn0	UNUSED	
37	PETp0	UNUSED	
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	

Pin Number	PCIe M.2 Name	Pin Name NX611	Description
74	GND	Ground	Ground
75	GND	Ground	Ground
76	GND/VIO_CFG	NC	
77	GND	Ground	Ground
78	GND	Ground	Ground
79	GND	Ground	Ground
80	GND	Ground	Ground
81	WL_C2	Bluetooth RF Out	
82	GND	Ground	Ground
83	GND	Ground	Ground
84	GND	Ground	Ground
85	GND	Ground	Ground
86	WL_C0	5G_2.4G WiFi RF Out (Shared WiFi and Bluetooth, single trace Pad variant)	
87	GND	Ground	Ground
88	GND	Ground	Ground
89	GND	Ground	Ground
90	GND	Ground	Ground
91	GND	Ground	Ground
92	WL_C1	UNUSED	
93	GND	Ground	Ground
94	GND	Ground	Ground
95	GND	Ground	Ground
96	GND	Ground	Ground
G1	GND	Ground	Ground

4 SONA™ NX611 M.2 2230 Module

This section describes the hardware footprint, mechanical drawing and hardware pinout of the NX611 M.2 2230 module. It provides details and pin assignments critical to hardware integration of the module.

4.1 SONA™ NX611 M.2 2230 Module Mechanical Drawing

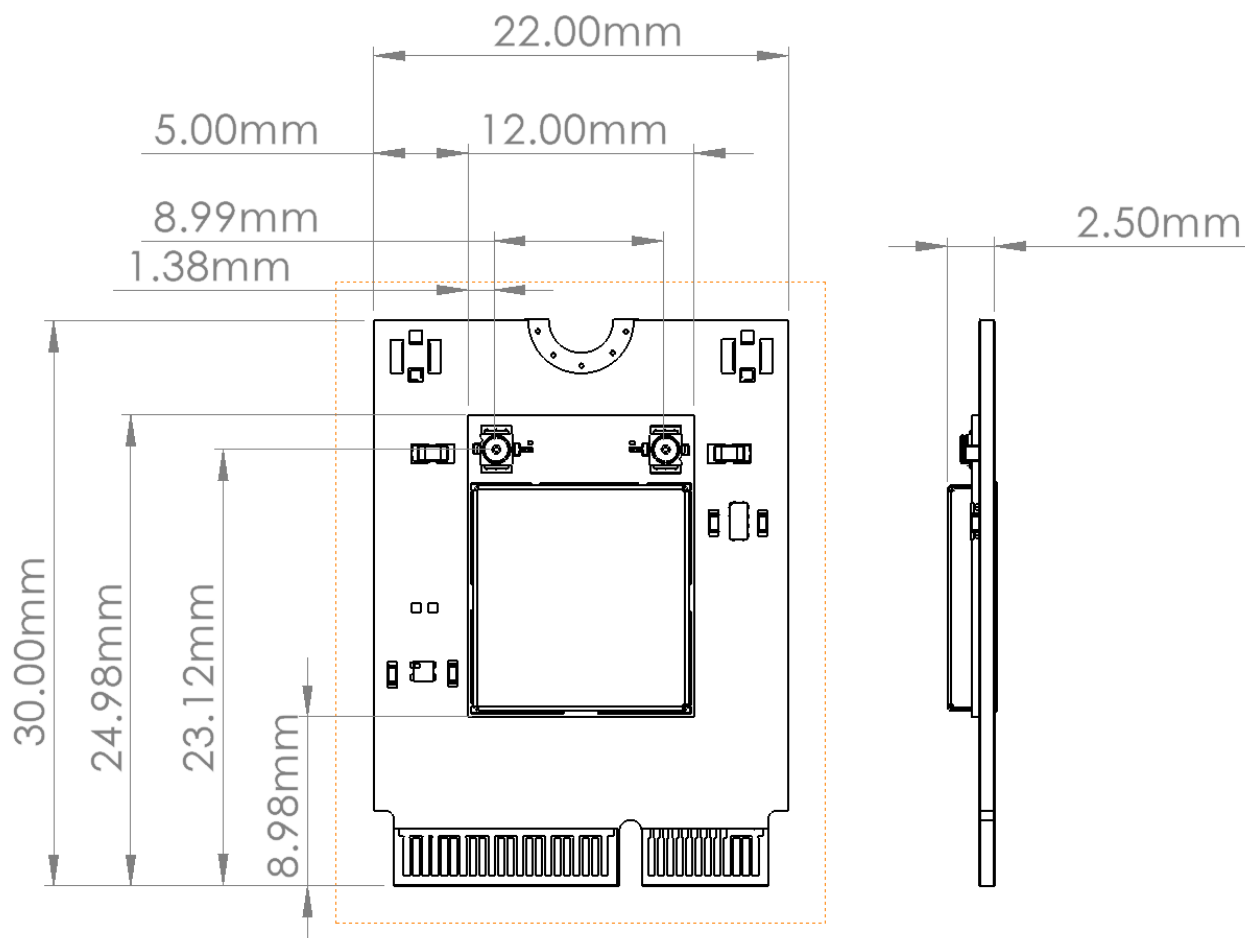


Figure 8: Mechanical Drawing – NX611 M.2 2230 module

Note: The Wi-Fi MAC address is located on the product label.

The last digit of Wi-Fi MAC address is assigned to either 0, 2, 4, 6, 8, A, C, E.

The Bluetooth MAC address is the Wi-Fi MAC address plus 1.

4.2 SONA™ NX611 M.2 2230 Module Pinout

Table 3: Sona NX611 M.2 2230 Module Pinout

Pin #	PCIe M.2 Name	Pin Name NX611
1	GND	GND
2	3.3 V	3.3 V
3	USB_D+	USB_D+
4	3.3 V	3.3 V
5	USB_D-	USB_D-
6	LED_1# (I)(OD)	LED_1# (I)(OD)
7	GND	GND
8	PCM_CLK/I2S_SCK (I/O)(0/1.8V)	PCM_CLK/I2S_SCK (I/O)(0/1.8V)
9	SDIO_CLK/SYSCLK (I) (0/1.8V)	SDIO_CLK/SYSCLK (I) (0/1.8V)
10	PCM_SYNC/I2S_WS (I/O)(0/1.8V)	PCM_SYNC/I2S_WS (I/O)(0/1.8V)
11	SDIO_CMD (I/O) (0/1.8V)	SDIO_CMD (I/O) (0/1.8V)
12	PCM_OUT/I2S_SD_OUT (O)(0/1.8V)	PCM_OUT/I2S_SD_OUT (O)(0/1.8V)
13	SDIO_DATA0 (I/O) (0/1.8V)	SDIO_DATA0 (I/O) (0/1.8V)
14	PCM_IN/I2S_SD_IN (I)(0/1.8V)	PCM_IN/I2S_SD_IN (I)(0/1.8V)
15	SDIO_DATA1 (I/O) (0/1.8V)	SDIO_DATA1 (I/O) (0/1.8V)
16	LED_2# (I)(OD)	LED_2# (I)(OD)
17	SDIO_DATA2 (I/O) (0/1.8V)	SDIO_DATA2 (I/O) (0/1.8V)
18	VIO_CFG/GND	VIO_CFG/GND
19	SDIO_DATA3 (I/O) (0/1.8V)	SDIO_DATA3 (I/O) (0/1.8V)
20	BT_15.4_WAKE_OUT	BT_15.4_WAKE_OUT
21	WL_WAKE_OUT:	WL_WAKE_OUT:
22	UART_RXD (I)(0/1.8V)	UART_RXD (I)(0/1.8V)
23	IND_RST_WL(I)	IND_RST_WL(I)
24-31	CONNECTOR KEY E	CONNECTOR KEY E
32	UART_RXD (I)(0/1.8V)	UART_RXD (I)(0/1.8V)
33	GND	GND
34	UART_RTS (O)(0/1.8V)	UART_RTS (O)(0/1.8V)
35	PETp0	PETp0
36	UART_CTS (I)(0/1.8V)	UART_CTS (I)(0/1.8V)
37	PERn0	PERn0
38	NC	NC
39	GND	GND
40	WL_WAKE_IN	WL_WAKE_IN
41	PETp0	PETp0
42	BT_WAKE_IN	BT_WAKE_IN
43	PETn0	PETn0
44	COEX3 (I/O)(0/1.8V)	COEX3 (I/O)(0/1.8V)

Pin #	PCIe M.2 Name	Pin Name NX611
45	GND	GND
46	COEX_TXD (O)(0/1.8V)	COEX_TXD (O)(0/1.8V)
47	REFCLKp0	REFCLKp0
48	COEX_RXD (I)(0/1.8V)	COEX_RXD (I)(0/1.8V)
49	REFCLKn0	REFCLKn0
50	SUSCLK (I)(0/1.8V/3.3V)	SUSCLK (I)(0/1.8V/3.3V)
51	GND	GND
52	PERST0# (I)(0/1.8V/3.3V)	PERST0# (I)(0/1.8V/3.3V)
53	CLKREQ0# (I/O)(0/1.8V/3.3V)	CLKREQ0# (I/O)(0/1.8V/3.3V)
54	IND_RST_BT (I)	IND_RST_BT (I)
55	PEWAKE0# (I/O)(0/1.8V/3.3V)	PEWAKE0# (I/O)(0/1.8V/3.3V)
56	PDn (I)	PDn (I)
57	GND	GND
58	NC	NC
59	RESERVED	RESERVED
60	NC	NC
61	RESERVED	RESERVED
62	NC	NC
63	GND	GND
64	RESERVED/VIO 1.8V	RESERVED/VIO 1.8V
65	RESERVED	RESERVED
66	UIM_SWP/PERST1#	UIM_SWP/PERST1#
67	RESERVED	RESERVED
68	UIM_POWER_SNK/CLKREQ1#	UIM_POWER_SNK/CLKREQ1#
69	GND	GND
70	UIM_POWER_SRC/ GPIO_1/PEWAKE1#	UIM_POWER_SRC/ GPIO_1/PEWAKE1#
71	RESERVED	RESERVED
72	3.3 V	3.3 V
73	RESERVED	RESERVED
74	3.3 V	3.3 V
75	GND	GND

5 FCC and ISED Modular Certification Requirements

Because these modules and their associated set of approved antennas has been certified by the FCC and Innovation, Science and Economic Development, Canada (ISED) as Modular Radios, 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.

The module must be used with one of the approved antennas:

Table 4: Sona Approved Antennas

Manufacturer	Model	Laird Part Number	Type	Connector	2.4GHz	5GHz	5.6GHz
Ezurio (Laird Connectivity)	FlexMIMO 6E	EFD2471A3S-10MH4L	PIFA	IPEX MHF4L	2.2dBi	3.8dBi	3.3dBi
Ezurio (Laird Connectivity)	FlexPIFA 6E	EFB2471A3S-10MH4L	PIFA	IPEX MHF4L	2.2dBi	3.9dBi	3.8dBi
Ezurio (Laird Connectivity)	Mini NanoBlade Flex 6E	EMF2471A3S-10MH4L	PCB Dipole	IPEX MHF4L	2.4dBi	4.4dBi	5.2dBi
Ezurio (Laird Connectivity)	FlexPIFA	001-0021	PIFA	IPEX MHF4L	2.5dBi	3.0dBi	
JOYMAX	Dipole 6E	TWX-100BRSAX-2001	Dipole	RP-SMA	2dBi	4dBi	4dBi

Note:

When using the module and the reference design that supports the off module MH4 connector(s), you may use a substitute antenna if it is of the same type and that the gain is less than or equal to the smallest gain for that type for each of the frequencies listed.

The OEM is free to choose another vendor's antenna of like type and equal or lesser gain as an antenna appearing in the table and still maintain compliance. Reference FCC Part 15.204(c)(4) for further information on this topic.

To reduce potential radio interference to other users, the antenna type and gain should be chosen so that the equivalent isotropic radiated power(EIRP) is not more than that permitted for successful communication.

Ezurio provides a FCC Modular Certified reference design. It is a controlled impedance PCB that uses microstrip trace design to route RF signals from the module to the coaxial connectors.

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

5.1 Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radiofrequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following

measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Important Note:

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 6.6cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Integration Instructions for Host Product Manufacturers

Applicable FCC rules to module:

FCC Part 15.247, FCC Part 15.407

Summarize the specific operational use conditions:

This device is intended only for OEM integrators under the following condition:

- The transmitter module may not be co-located with any other transmitter or antenna

As long as 1 condition above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid, and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end-product (including the transmitter) and obtaining a separate FCC authorization. The OEM integrator must be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end-product which integrates this module.

The end user manual shall include all required regulatory information/warning as shown in this manual.

Limited module procedures

Not applicable

Trace antenna designs

There are antenna coupling network trace designs associated with integration of the system-in-package (SIP) form factor of this device. The trace design details are shown in section 6 of this guide. The trace design information also references the integrator to a Computer-Aided-Design (CAD) package description of the trace design for a precise description of both the lateral and vertical geometry of the design as well as the physical PCB materials.

RF exposure considerations

Co-located issue shall be met as mentioned in Summarize the specific operational use conditions.

Product manufacturer shall provide the following text in the end-product manual:

FCC Radiation Exposure Statement

The product complies with the US portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

A 6.6-centimeter separation distance and co-located issue shall be met as mentioned in Summarize the specific operational use conditions.

Product manufacturer shall provide the following text in the end-product manual:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 6.6 centimeters between the radiator and your body.

Label and Compliance Information

Product manufacturers must provide, with the finished product, a physical or e-label that states the following:

Contains FCC ID: SQG-SONANX611

Information on Test Modes and Additional Testing Requirements

Test tool: The NXP LabTool shall be used to set the module to transmit continuously. Please contact Ezurio for further information and usage conditions.

Additional Testing, Part 15 Subpart B Disclaimer

The module is only FCC authorized for the specific rule parts listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed

5.2 Innovation, Science and Economic Development, Canada (ISED) Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage;
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This radio transmitter (IC: 3147A-SONANX611) has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed in Table 4 above, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio (IC: 3147A-SONANX611) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessus dans le tableau 4 et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Radiation Exposure Statement:

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 6cm between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 6cm entre le radiateur et votre corps.

This device is intended only for OEM integrators under the following conditions:

- 1) The transmitter module may not be co-located with any other transmitter or antenna.

As long as the condition above is met, further transmitter testing is not required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes:

- 1) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 1 condition ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

IMPORTANT NOTE: In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

NOTE IMPORTANTE: Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

The final end product must be labeled in a visible area with the following: "Contains IC: 3147A-SONANX611".

Plaque signalétique du produit final

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 3147A-SONANX611.

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dansle manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

6 Sona NX611 SIP Certified Module Host Board Requirements

Table 5: Sona NX611 SIP Modules

Part Number	Description
453-00155	Module, Sona NX611 SIP, 2 RF Trace Pin
453-00156	Module, Sona NX611 SIP, 1 RF Trace Pin

The reference design for the Ezurio Sona NX611 SIP Module has been integrated into the Sona NX611 Development Board. It is 6-layer PCB with a total thickness of 0.79mm. The reference design includes designs for the single port version as well as the dual port version.

To comply with FCC regulations, the RF area of host design must match the RF area of the reference design exactly. To match exactly, the distance from the top layer to the RF reference ground plane on host PCB and the Dk of the host board must match the Reference design. When the reference ground plane and Dk of the host board match, the 50 ohm RF trace widths will be the same and the host board copper can match the reference board copper.



Figure 9: Sona NX611

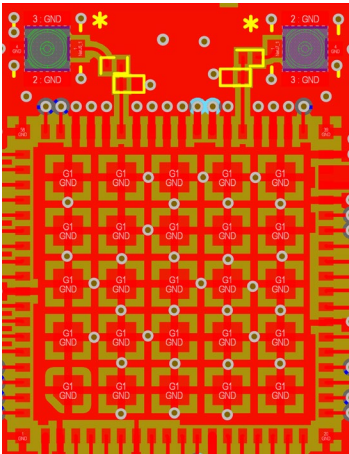
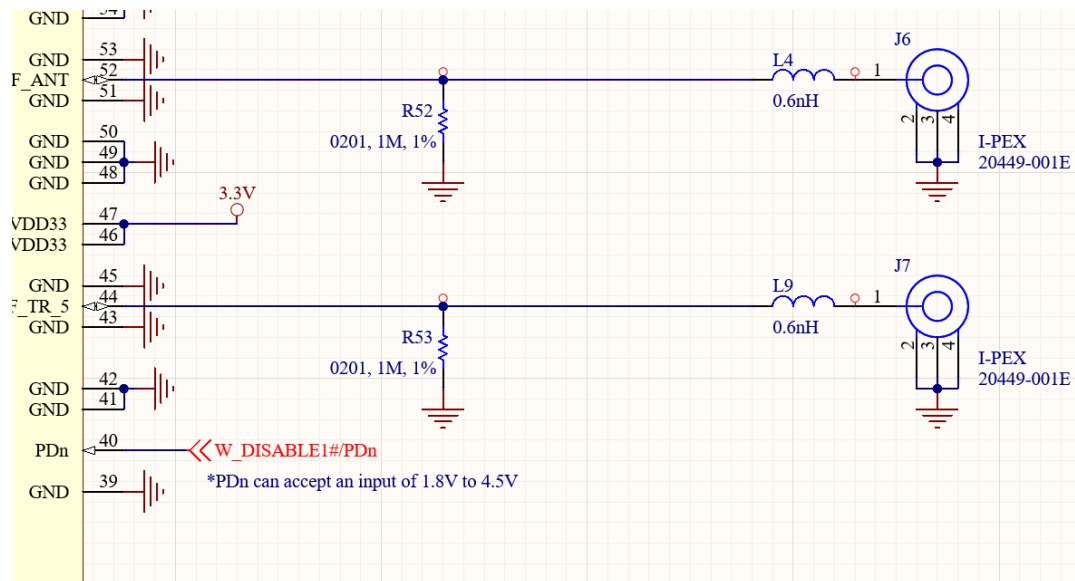


Figure 10: Sona NX611 PCB Reference

#	Name	Material	Type	Weight	Thickness	Dk	Df
	Top Overlay		Overlay				
	Top Solder	SM-003	Solder Mask		1mil	4	0.03
1	Top Layer		Signal	1oz	1.3mil		
	Dielectric 1	PP-008	Prepreg		3.1mil	4.1	0.02
2	L1 (GND)		Signal	1oz	1.2mil		
	Dielectric 2	PP-012	Prepreg		3.8mil	4	0.02
3	L2	CF-004	Signal	1oz	1.378mil		
	Dielectric2	PP-023	Prepreg		8.6mil	4.5	0.02
4	L3	CF-004	Signal	1oz	1.378mil		
	Dielectric 4	PP-012	Prepreg		3.8mil	4	0.02
5	L4(PWR)		Signal	1oz	1.2mil		
	Dielectric 3	PP-008	Prepreg		3.1mil	4.1	0.02
6	Bottom Layer		Signal	1oz	1.3mil		
	Bottom Solder	SM-003	Solder Mask		1mil	4	0.03
	Bottom Overlay		Overlay				

Figure 11: Sona NX 611 SIP PCB Stack-up

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



In addition to matching the reference design layout, there are several RF critical BOM components in the reference design that cannot be substituted shown in **Table 6**.

Table 6: RF Critical Components BOM

PCB Ref	Value	Manufacturer	Mfg Part Number	Alt. Manufacturer	Alt. Mfg Part Number
L4, L9	0.6nH	Murata	LQP03TN0N6B02D	-	-
J6, J7	MH4	I-PEX	20449-001E	Taoglas	20449.001E-01

*** RF Critical Components That Cannot be Substituted**

7 SONA™ NX611 M.2 2230 Module Mounting Guidelines

The Sona NX611 M.2 2230 module connects to the host via a standard PCI EXPRESS M2 connector. The Kyocera (www.Kyocera-connector.com) 6411 series provides 1.8 mm, 2.3 mm and 3.2 mm connector heights and the JAE (<https://www.jae.com/en/>) SM3 series provides 1.2 mm, 2.15 mm, 3.1 mm and 4.1 mm connector heights.

Because the Sona NX611 M.2 module is a single-side component module, we recommend the following part numbers which have 2.3 mm and 3.1 mm connector height:

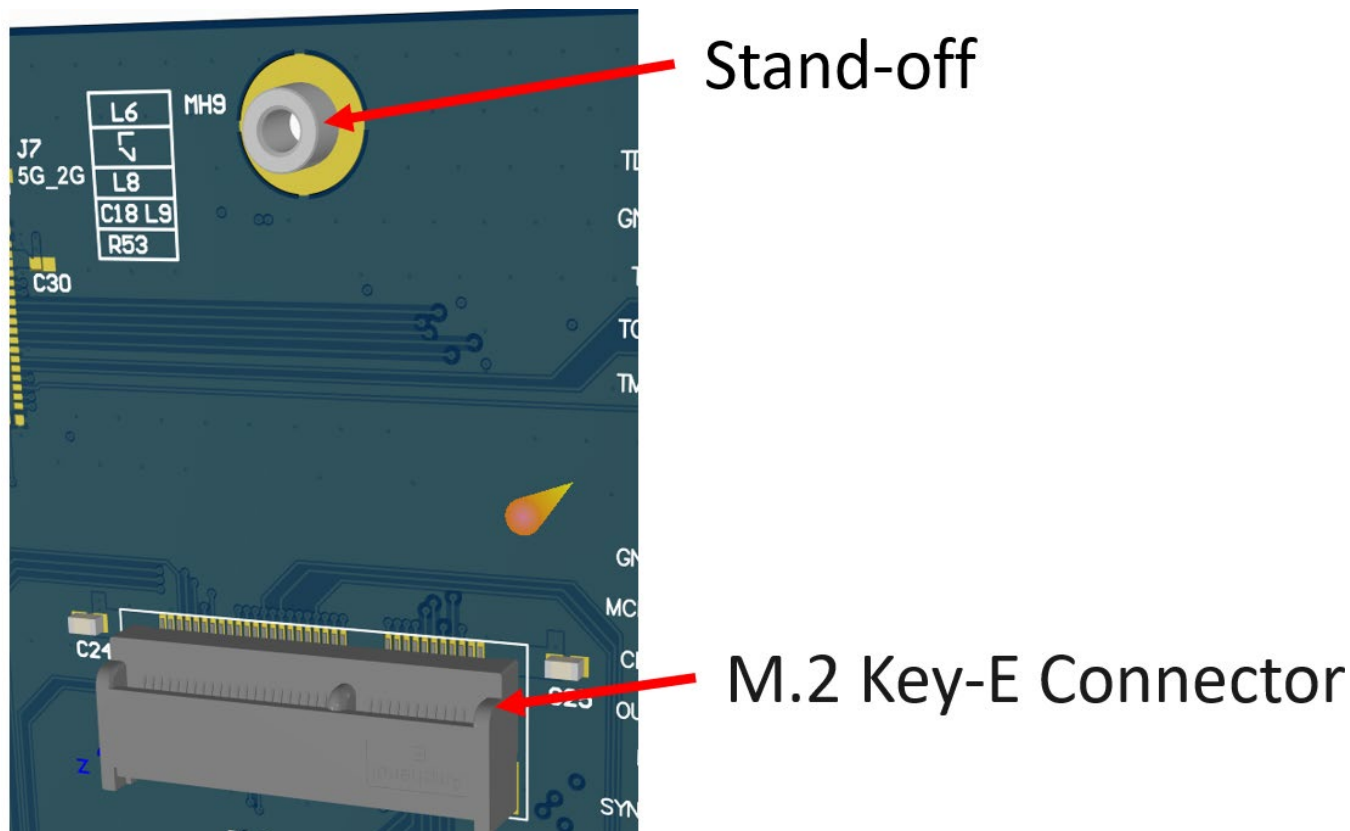


Figure 12: Sona NX611 M.2 2230 Stand-off and Connector

M.2 Key-E Connector	Connector Height	Stand-off
KYOCERA 24-6411-067-101-894E	2.3 mm	EMI STOP F50M16-041525P1D4M
JAE SM3ZS067U310AERxxxx	3.1 mm	JAE SM3ZS067U310-NUT1-Rxxxx

8 Regulatory

Note: For complete regulatory information, refer to the [SONA™ NX61X Regulatory Information](#) document (coming soon) which is also available from the [SONA™ NX61X product page](#).

The SONA™ NX61X holds current certifications in the following countries:

Table 7: SONA™NX61X countries with certification (SIP)

Country/Region	Regulatory ID
USA (FCC)	SQG-SONANX611S
EU	N/A
Canada (ISED)	3147A-SONANX611S
Japan (MIC)	TBD
Australia	N/A
New Zealand	N/A

Table 8: SONA™NX61X countries with certification (M.2 1216 Module and M.2 2230 Module)

Country/Region	Regulatory ID
USA (FCC)	SQG-SONANX611M
EU	N/A
Canada (ISED)	3147A-SONANX611M
Japan (MIC)	TBD
Australia	N/A
New Zealand	N/A