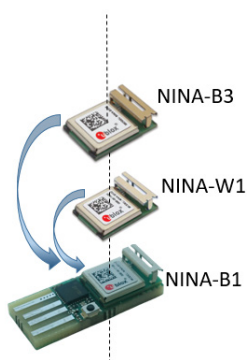


# NINA module family

## Nested design

### Application Note



### Abstract

This application note describes design guidelines for NINA-B1, NINA-B2, NINA-W1, and NINA-B3 short range modules. It is intended to be used as a guideline for mounting NINA family modules on the same PCB footprint.

# Document Information

<b>Title</b>	<b>NINA module family</b>	
<b>Subtitle</b>	Nested design	
<b>Document type</b>	Application Note	
<b>Document number</b>	UBX-17065600	
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<b>Disclosure Restriction</b>		

This document applies to the following products:

<b>Product name</b>
NINA-B1 series
NINA-W1 series
NINA-B2 series
NINA-B3 series

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# 1 Overview

This application note contains design guidelines and necessary hardware information to be considered while designing the host PCB for all NINA family modules.

NINA-B1 and NINA-W1 have the same footprint. NINA-B3 is based on the larger radio chip (which is 7 x 7 mm vs the old 6 x 6 mm) and has additional GPIO pins. Due to this, the NINA-B3 module is slightly larger than other modules in the NINA family.

 This application note should be used together with the system integration manual and datasheet for the applicable modules. See the related documents section.

## 2 NINA family design description

### 2.1 NINA family pin-out

All critical interfaces (UART, VCC, GND, Switches, and LEDs) are on the same pins on all modules in the NINA family. Additional guidelines are provided below.

The NINA-B3 series modules are slightly bigger than other modules in the NINA family. During the design, the pin-outs for NINA-B1, NINA-B2, and NINA-W1 were kept in mind, so that all modules belonging to the NINA family can be placed on the same footprint.

- ⚠ NINA-B3 can be mounted on the PCB designed for NINA-B1 but during product design with the NINA-B1 module, it is recommended to have 1 mm keep-out area to have enough place to mount NINA-B3 instead of NINA-B1. For more details, see section 3.

Figure 1 shows the pin-out and size of different NINA modules.

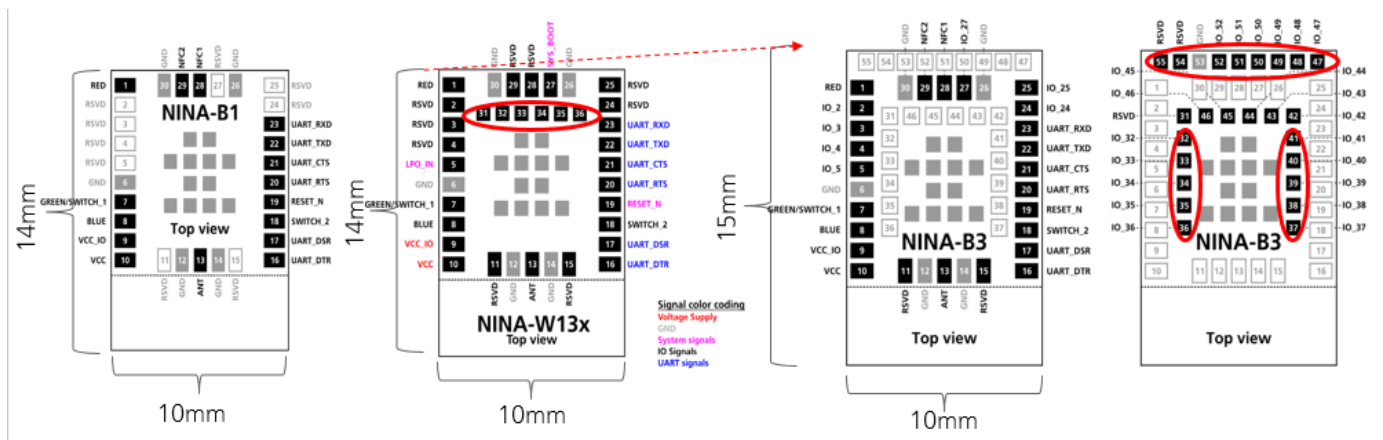


Figure 1: NINA modules pin-out

### 2.2 Module pin-out comparison

Table 1 summarizes the electrical differences of pins on the NINA family modules.

Pin	NINA-B1: Pin 1 - 30	NINA-W1/B2: Pin 1 - 36	NINA-B3: Pin 1 - 55	Comment
1	Red	Red	Red	
2	IO_2	GPI_2	IO_2	
3	IO_3	GPI_3	IO_3	
4	IO_4	GPI_4	IO_4	
5	IO_5	LPO_IN	IO_5	NINA-W1: In LPO_IN mode, the signal needs to be 0/0.7 V; e.g., via an external voltage divider
6	GND	GND	GND	
7	Green/Switch_1	Green/Switch_1	Green/Switch_1	
8	Blue SWO/GPIO_8)*	Blue	Blue (SWO/TRACE_D0/GPIO_8)*	*Trace-Serial wire output available on the NINA-B1 and NINA-B3 open CPU variants
9	VCC_IO	VCC_IO	VCC_IO	
10	VCC	VCC	VCC	NINA-W1 needs 300 mA
11	RSVD (SWDCLK)*	RSVD	RSVD (SWDCLK)*	*SWD interface for NINA-B1 and NINA-B30X
12	GND	GND	GND	
13	Ant	Ant	Ant	For external antenna version only

Pin	NINA-B1: Pin 1 - 30	NINA-W1/B2: Pin 1 - 36	NINA-B3: Pin 1 - 55	Comment
14	GND	GND	GND	
15	RSVD (SWDIO)*	RSVD	RSVD (SWDIO)*	*SWD interface for NINA-B1 and NINA-B30x
16	UART_DTR	UART_DTR	UART_DTR	
17	UART_DSR	UART_DSR	UART_DSR	
18	Switch_2	Switch_2	Switch_2	
19	Reset_N	Reset_N	Reset_N	
20	UART_RTS	UART_RTS	UART_RTS	
21	UART_CTS	UART_CTS	UART_CTS	
22	UART_TXD	UART_TXD	UART_TXD	
23	UART_RXD	UART_RXD	UART_RXD	
24	IO_24	GPIO_24	IO_24	
25	IO_25	GPIO_25	IO_25	Bootstrap pin for NINA-W1 Pull-up, Pull-down
26	GND	GND	GND	
27	IO_27	Sys_Boot	IO_27	Bootstrap pin for NINA-W1 Pull-up, Pull-down
28	NFC1	GPIO_28	NFC1	
29	NFC2	GPIO_29	NFC2	Pull-up
30	GND	GND	GND	
31		GPIO_31	RSVD	
32		GPIO_32	IO_32	Boot strap pin for NINA-W1, Pull up
33		RSVD	IO_33	
34		GPI_34	IO_34	
35		GPIO_35	IO_35	
36		GPIO_36	IO_36	Boot strap pin for NINA-W1, 10k pull-up
37			IO_37	
38			IO_38	
39			IO_39	
40			IO_40	
41			IO_41	
42			IO_42	
43			IO_43	
44			IO_44	
45			IO_45	
46			IO_46	
47			IO_47	
48			IO_48	
49			IO_49	
50			IO_50	
51			IO_51	
52			IO_52	
53			GND	
54			RSVD	
55			RSVD	

**Table 1: Summary of pin differences and compatibility levels between different NINA modules**

### 3 NINA series nested footprint

The footprint of the NINA-B3 series module contains the maximum number of pins and should be used as a reference if a nested design is required.

It is then possible to mount all modules in the NINA family on this footprint.

See section 3.1 for a short description on the mechanical specification of the NINA-B3 module. A detailed description with complete measurements can be found in the *NINA-B3 series Data sheet [8]*.

- ⚠ Use a paste mask designed for the specific NINA module as there should not be any soldering paste on the unused pins.

#### 3.1 Footprint and paste mask

The proposed land pattern layout reflects the pad's layout of the module.

The Non Solder Mask Defined (NSMD) pad type is recommended over the Solder Mask Defined (SMD) pad type, which implements the solder mask opening 50  $\mu\text{m}$  larger per side than the corresponding copper pad.

The suggested paste mask layout for the NINA module family modules is to follow the copper mask layout as described in this section.

- ⚠ These are recommendations only and not specifications. The exact mask geometries, distances, and stencil thicknesses must be adapted to the specific production processes of the customer.

#### 3.2 NINA-B3x2 Mechanical specifications

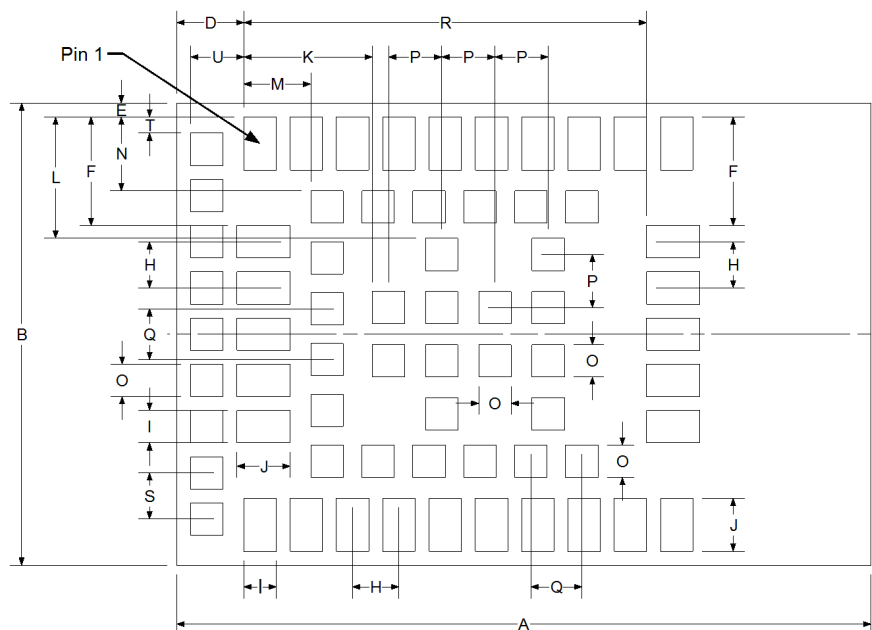


Figure 1: NINA-B3x2 mechanical outline

Parameter	Description	Typical [mm]	[mil]	Tolerance [mm]	[mil]
A	Module PCB length	15.0			
B	Module PCB width	10.0			
C	Module thickness	3.87			
ccc	Seating plane coplanarity	0.10			
D	Horizontal edge to lateral pin no. 1 edge	1.45			
E	Vertical edge to lateral pin no. 1 edge	0.30			
F	Vertical pin no. 1 edge to lateral pin edge	2.35			
G	Depanelizing residual	0.10			
H	Lateral and antenna row pin to pin pitch	1.00			
I	Lateral, antenna row and outer pin width	0.70			
J	Lateral and antenna row pin length	1.15			
K	Horizontal pin no. 1 edge to central pin edge	2.775			
L	Vertical pin no. 1 edge to central pin edge	2.625			
M	Horizontal pin no. 1 Edge to inner row pin edge [mm]	1.45			
N	Vertical pin no.1 edge to inner row pin edge [mm]	1.6			
O	Central, inner and outer row pin width and length	0.70			
P	Central pin to central pin pitch	1.15			
Q	Inner row pin to pin pitch	1.1			
R	Horizontal pin no. 1 edge to antenna row pin edge	8.7			
S	Outer row pin to pin pitch	1.0			
T	Vertical pin no. 1 edge to outer row pin edge	0.35			
U	Horizontal pin no. 1 edge to outer row pin edge	1.15			
V	PCB and shielding cover thickness	2.27			
W	Module antenna width	3.8			
X	Antenna overhang outside module outline on any side	0.0		+0.60	
	Module weight [g]	<1.0			

**Table 2: NINA-B3x2 mechanical outline data**



# Appendix


## A Glossary

Abbreviation	Definition
BOM	Bill Of Materials
GPIO	General Purpose Input Output
LED	Light Emitting Diode
NSMD	Non Solder Mask Defined
PCB	Printed Circuit Board
SMD	Solder Mask Defined
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus

**Table 3: Explanation of the abbreviations and terms used**

## Related documents

- [1] NINA-B1 series System Integration Manual, Doc. No. UBX-15026175
- [2] NINA-B1 Getting Started guide, Doc. No. UBX-16009942
- [3] u-blox Short Range Modules AT Commands Manual, Doc. No. UBX-14044127
- [4] NINA-B1 series Data sheet, Doc. No. UBX-15019243
- [5] NINA-W1 series System Integration Manual, Doc. No. UBX-17005730
- [6] NINA-W13 series Data sheet, Doc. No. UBX-17006694
- [7] NINA-B3 series System Integration Manual, Doc. No. UBX-17056748
- [8] NINA-B3 series Data sheet, Doc. No. UBX-17052099
- [9] NINA-B2 series System Integration Manual, Doc. No. UBX-18011096
- [10] NINA-B2 series Data sheet, Doc. No. UBX-18006649

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## Revision history

Revision	Date	Name	Comments
R01	15-May-2018	fbro	Initial release.
R02	21-Sep-2018	fbro	Changed the subtitle.

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