

Stand-alone Bluetooth modules



	Bluetooth					
	NINA-B400	NINA-B406	BMD-380	BMD-345	BMD-341	BMD-340
Grade						
Automotive						
Professional	•	•				
Standard			•	•	•	•
Physical						
Image						
Size [mm]	10.0 x 15.0 x 2.2		7.5 x 9.5 x 1.5	10.2 x 15.0 x 1.9		
Operating temperature [°C]	-40 to +105		-40 to +85	-40 to +85		
Radio						
Chip inside	nRF52833		nRF52840	nRF52840		
Bluetooth qualification	v5.1	v5.1	v5.0	v5.0	v5.0	v5.0
Bluetooth low energy	•	•	•	•	•	•
Bluetooth BR/EDR						
Thread / Zigbee	•	•	•	•	•	•
Bluetooth output power EIRP [dBm]	10	10	7	16	13	7
Max range [meters]	1400	1400	500	1000	750	500
NFC	•	•	•	•	•	•
Antenna type (see footnotes)	U.FL	pcb	chip	U.FL	U.FL	pcb
Application software						
u-connectXpress						
Open CPU for embedded applications	•	•	•	•	•	•
Interfaces						
UART	◆	◆	◆	◆	◆	◆
SPI	◆	◆	◆	◆	◆	◆
I2C	◆	◆	◆	◆	◆	◆
I2S	◆	◆	◆	◆	◆	◆
USB	◆	◆	◆	◆	◆	◆
PDM and PWM	◆	◆	◆	◆	◆	◆
AD converters [number of bits]	12	12	12	12	12	12
GPIO pins	38	38	44	44	48	48
Features						
MCU (see footnotes)	M4F	M4F	M4F	M4F	M4F	M4F
RAM [kB]	128	128	256	256	256	256
Flash [kB]	512	512	1024	1024	1024	1024
Simultaneous GATT server and client	◆	◆	◆	◆	◆	◆
Throughput [Mbit/s]	1.4	1.4	1.4	1.4	1.4	1.4
Maximum Bluetooth connections	20	20	20	20	20	20
Bluetooth mesh	◆	◆	◆	◆	◆	◆
Direction finding (AoA/AoD)	◆	◆				
Secure boot	◆	◆	◆	◆	◆	◆
FOTA	◆	◆	◆	◆	◆	◆

pcb = Internal PCB antenna
chip = Internal chip antenna

U.FL = U.FL antenna connector
M4F = 64 MHz Arm® Cortex-M4 with FPU

◆ = Feature enabled by hardware. The actual support depends on the open CPU application software.

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Stand-alone Bluetooth modules



	Bluetooth							
	NINA-B301	NINA-B302	NINA-B306	NINA-B311	NINA-B312	NINA-B316	NINA-B221	NINA-B222
Grade								
Automotive								
Professional	•	•	•	•	•	•	•	•
Standard								
Physical								
Image								
Size [mm]	10.0 x 11.6 x 2.2 / 10.0 x 15.0 x 3.8 / 10.0 x 15.0 x 2.2						10.0 x 10.6 x 2.2 / 3.8	
Operating temperature [°C]	-40 to +85							
Radio								
Chip inside	nRF52840						ESP32	
Bluetooth qualification	v5.0	v5.0	v5.0	v5.0	v5.0	v5.0	v4.2	
Bluetooth low energy	•	•	•	•	•	•	•	•
Bluetooth BR/EDR							•	•
Thread / Zigbee	•	•	•					
Bluetooth output power EIRP [dBm]	10	10	10	10	10	10	8	8
Max range [meters]	1400	1400	1400	1400	1400	1400	200	200
NFC	•	•	•	•	•	•		
Antenna type (see footnotes)	pin	metal	pcb	pin	metal	pcb	pin	metal
Application software								
u-connectXpress				•	•	•	•	•
Open CPU for embedded applications	•	•	•					
Interfaces								
UART	◆	◆	◆	1	1	1	1	1
SPI	◆	◆	◆				1	1
I2C	◆	◆	◆					
I2S	◆	◆	◆					
USB	◆	◆	◆					
PDM and PWM	◆	◆	◆					
AD converters [number of bits]	12	12	12					
GPIO pins	38	38	38	28	28	28	21	21
Features								
AT command interface				•	•	•	•	•
MCU (see footnotes)	M4F	M4F	M4F					
RAM [kB]	256	256	256					
Flash [kB]	1024	1024	1024					
Simultaneous GATT server and client	◆	◆	◆	•	•	•	•	•
Low Energy Serial Port Service				•	•	•	•	•
Throughput [Mbit/s]	1.4	1.4	1.4	0.8	0.8	0.8	1.0	1.0
Maximum Bluetooth connections	20	20	20	8	8	8	7	7
Bluetooth mesh	◆	◆	◆	•	•	•		
Secure boot	◆	◆	◆	•	•	•	•	•
FOTA	◆	◆	◆					

pin = Antenna pin
pcb = Internal PCB antenna

metal = Internal metal PIFA antenna
M4F = 64 MHz Arm® Cortex-M4 with FPU

◆ = Feature enabled by hardware. The actual support depends on the open CPU application software.

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Stand-alone Bluetooth modules



	Bluetooth																		
	ANNA-B112		NINA-B111		NINA-B112		BMD-350		BMD-301		BMD-300		BMD-360		BMD-330		R41Z		
Grade																			
Automotive																			
Professional	•		•		•				•	•	•			•		•		•	
Standard																			
Physical																			
Image																			
Size [mm]	6.5 x 6.5 x 1.2		10.0 x 10.6 x 2.2 / 3.8				6.4 x 8.6 x 1.5		9.8 x 14.0 x 1.9						10.6 x 16.2 x 2.1				
Operating temperature [°C]	-40 to +85																		
Radio																			
Chip inside	nRF52832		nRF52832				nRF52832						nRF52811		nRF52810		KW41Z		
Bluetooth qualification	v5.0		v5.0		v5.0		v5.0		v5.0		v5.0		v5.1		v5.0		v4.2		
Bluetooth low energy	•		•		•		•	•	•			•		•		•		•	
Bluetooth BR/EDR																			
Thread / Zigbee																			
Bluetooth output power EIRP [dBm]	5 / 8 *		7		6		5		9		3		3		3		3		
Max range [meters]	160 / 190 *		350		300		190		400		200		200		200		150		
NFC	•		•		•		•	•	•			•		•		•		•	
Antenna type (see footnotes)	chip / pin		pin		metal		chip		U.FL		pcb		pcb		pcb		pcb		
Application software																			
u-connectXpress	•		•		•				•	•	•			•		•		•	
Open CPU for embedded applications		•		•		•		•		•		•		•		•		•	
Interfaces																			
UART	1		1		1		♦		♦		♦		♦		♦		♦		
SPI	♦		♦		♦		♦		♦		♦		♦		♦		♦		
I2C	♦		♦		♦		♦		♦		♦		♦		♦		♦		
I2S	♦		♦		♦		♦		♦		♦		♦		♦		♦		
TSI																			
PDM and PWM	♦		♦		♦		♦		♦		♦		♦		♦		♦		
AD converters [number of bits]	12		12		12		12		12		12		12		12		16		
GPIO pins	11 25		7 19		7 19		32		32		32		32		32		25		
Features																			
AT command interface	•		•		•														
Direction finding (AoA/AoD)																			
MCU (see footnotes)	M4F		M4F		M4F		M4F		M4F		M4F		M4		M4		M0+		
RAM [kB]	64		64		64		64		64		64		24		24		128		
Flash [kB]	512		512		512		512		512		512		192		192		512		
Simultaneous GATT server and client	•	♦	•	♦	•	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	
Low Energy Serial Port Service	•		•		•														
Throughput [Mbit/s]	0.8 1.4		0.8 1.4		0.8 1.4		1.4		1.4		1.4		1.4		1.4		1.4		
Maximum Bluetooth connections	7 20		7 20		7 20		20		20		20		4		4		2		
Bluetooth mesh	♦		♦		♦		♦		♦		♦		♦		♦		♦		
Secure boot																			
FOTA	♦		♦		♦		♦		♦		♦		♦		♦		♦		

pin = Antenna pin
pcb = Internal PCB antenna
* = Different values for use with internal or external antenna

chip = Internal chip antenna
metal = Internal metal PIFA antenna
U.FL = U.FL antenna connector

M0+ = 48 MHz Arm® Cortex-M0+
M4 = 64 MHz Arm® Cortex-M4
M4F = 64 MHz Arm® Cortex-M4 with FPU

♦ = Feature enabled by hardware. Actual support depends on the open CPU application software.

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Stand-alone short range radio modules



	Multiradio (Wi-Fi and Bluetooth)									Wi-Fi	
	ODIN-W260	ODIN-W262	ODIN-W263	NINA-W151	NINA-W152	NINA-W156	NINA-W101	NINA-W102	NINA-W106	NINA-W131	NINA-W132
Grade											
Automotive											
Professional	•	•	•	•	•	•	•	•	•	•	•
Standard											
Physical											
Image											
Size [mm]	14.8 x 22.3 x 3.2 / 4.7			10.0 x 10.6 x 2.2 / 10.0 x 14.0 x 3.8 / 10.0 x 14.0 x 2.2							
Operating temperature [°C]	-40 to +85										
Radio											
Chip inside	WL1837			ESP32			ESP32			ESP32	
Bluetooth qualification	v4.0			v4.2			v4.2				
Bluetooth low energy	•	•	•	•	•	•	•	•	•		
Bluetooth BR/EDR	•	•	•	•	•	•	•	•	•		
Bluetooth output power EIRP [dBm]	14	11	11	8	8	8	8	8	8		
Antenna type (see footnotes)	U.FL	metal	metal	pin	metal	pcb	pin	metal	pcb	pin	metal
Wi-Fi 2.4 / 5 [GHz]	2.4 and 5	2.4 and 5	2.4 and 5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Wi-Fi IEEE 802.11 standards	a/b/g/n	a/b/g/n	a/b/g/n	b/g/n	b/g/n	b/g/n	b/g/n	b/g/n	b/g/n	b/g/n	b/g/n
Wi-Fi output power EIRP [dBm]	18	15	15	18	18	18	18	18	18	18	18
Max Wi-Fi range [meters]	300	250	250	500	400	400	500	400	400	500	400
Application software											
u-connectXpress	•	•	•	•	•	•				•	•
Open CPU for embedded apps							•	•	•		
Interfaces											
UART	1	1	1	1	1	1	◆	◆	◆	1	1
SPI				1	1	1	◆	◆	◆	1	1
I2C							◆	◆	◆		
I2S							◆	◆	◆		
RMII	1	1	1	1	1	1	◆	◆	◆	1	1
GPIO pins	23	23	23	21	21	23	24	24	26	21	21
AD converters [number of bits]							12	12	12		
Features											
AT command interface	•	•	•	•	•	•				•	•
Point-to-Point Protocol	•	•	•	•	•	•	◆	◆	◆	•	•
Low Energy Serial Port Service	•	•	•	•	•	•	◆	◆	◆		
MCU (see footnotes)				LX6	LX6	LX6	LX6	LX6	LX6	LX6	LX6
RAM [kB]				520	520	520	520	520	520	520	520
Flash [kB]				2048	2048	2048	2048	2048	2048	2048	2048
Wi-Fi throughput [Mbit/s]	20	20	20	13	13	13	25	25	25	16	16
Maximum Bluetooth connections	7	7	7	7	7	7	8	8	8		
Micro Access Point [max stations]	10	10	10	10	10	10	10	10	10	10	10
Wi-Fi enterprise security	•	•	•	•	•	•	◆	◆	◆	•	•
End-to-end security (TLS)	•	•	•	•	•	•	◆	◆	◆	•	•
Secure boot				•	•	•	◆	◆	◆	•	•
WPA/WPA2	•	•	•	•	•	•	◆	◆	◆	•	•
ATEX / IECEx certified	•	•									

pin = Antenna pin
 metal = internal metal PIFA antenna
 pcb = internal PCB antenna

U.FL = U.FL connector(s) for externa antenna
 LX6 = 240 MHz dual-core Xtensa LX6

◆ = Feature enabled by hardware. The actual support depends on the open CPU application software.

Host-based short range radio modules and chips



	V2X						Wi-Fi	
	VERA-P173	VERA-P174	VERA-P311	VERA-P321	UBX-P3011	UBX-P3021	LILY-W131	LILY-W132
Grade								
Automotive	•	•	•	•	•	•	•	•
Professional								
Standard								
Physical								
Image								
Size [mm]	24.8 x 29.6 x 3.5				9.0 x 11.0 x 1.04		10.0 x 14.0 x 2.2 / 3.8	
Operating temperature [°C]	-40 to +95		-40 to +105		-40 to +105		-40 to +85	
Radio								
Wi-Fi IEEE 802.11 standards	p	p	p	p	p	p	b/g/n	b/g/n
Wi-Fi 2.4 / 5 [GHz]							2.4	2.4
LTE filter								•
Channel width [MHz]	10	10	10 or 20	10 or 20	10/20	10/20	20	20
Rx/Tx diversity	•	•		•		•		
Antenna type (see footnotes)	2p	2p	pin	2p	2p	2p	pin	metal
OS support								
Android / Linux	Linux	Linux	Linux	Linux	Linux	Linux	both	both
QNX (via third party)			o	o	o	o		
Interfaces								
High-speed UART	2	2	3	3	4	4		
Ethernet (RGMII/MII/Reverse MII)			1	1	1	1		
I2C					1	1		
Quad SPI and Octal SPI			1	1	1	1		
SDIO [version]			v3	v3	v3	v3	v2	v2
USB 2.0	1	1					1	1
GPIO	8	8	16	16	20	20		
PPS	1	1	1	1	1	1		
Features								
Micro Access Point [max connects]							8	8
AES hardware support							•	•
Wi-Fi direct							•	•
Factory-assigned MAC address in OTP			•	•			•	•
Factory calibrated RF in OTP			•	•			•	•
Antenna diversity	•	#		•		•		
Single channel operation	•	•	•	•	•	•		
Concurrent dual-channel operation		#						
Security Acceleration Engine	•		•	•	•	•		

o = On request
m = Metal PIFA antenna

pin = 1 pin for external antenna
2p = 2 pins for 2 external antennas

= User can configure as dual-channel or diversity

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Host-based short range radio modules



	Multiradio (Wi-Fi and Bluetooth)									
	JODY-W374	JODY-W377	JODY-W263	JODY-W263-A	JODY-W163	JODY-W164	JODY-W167	EMMY-W161	EMMY-W163	EMMY-W165
Grade										
Automotive	•	•		•	•	•	•	•	•	•
Professional	•	•	•					•	e*	•
Standard										
Physical										

Image



Size [mm]	13.8 x 19.8 x 2.5						13.8 x 19.8 x 2.5			
Operating temperature [°C]	-40 to +85		-40 to +105		-40 to +85					
Radio										
Bluetooth qualification	v5.1		v5.0		v5.0 (without optional features)			v4.2		
Bluetooth profiles	HCI		HCI		HCI			HCI		
Bluetooth BR/EDR	•	•	•	•	•	•	•	•	•	
Bluetooth low energy	•	•	•	•	•	•	•	•	•	
Wi-Fi IEEE 802.11 standards	a/b/g/n/ac/ax		a/b/g/n/ac		a/b/g/n/ac			a/b/g/n/ac		
Wi-Fi 2.4 / 5 [GHz]	2.4 and 5		2.4 and 5		2.4 and 5			2.4 and 5		
LTE filter	o	o			o	o		•		
Bluetooth output power conducted [dBm]	10	10	10	10	10	10	10	10	10	
Wi-Fi output power conducted [dBm]	18	18	18	18	18	18	18	18	18	
Antenna type (see footnotes)	2p	3p	2p	2p	2p	2p	3p	pin	2p	pin
OS support										
Android / Linux drivers	•	•	•	•	•	•	•	•	•	•
QNX (via third party)					•	•	•	•	•	•
Interfaces										
High-speed UART ^B	1	1	1	1	1	1	1	1	1	1
PCIe ^W	1	1				1	1			
SDIO [version] ^W	v3	v3	v3	v3	v3			v3	v3	v3
PCM (Bluetooth audio)	1	1	1	1	1	1	1	1	1	1
Features										
Micro Access Point [max connects]	32	32	8	8	10	10	10	10	10	10
AES hardware support	•	•	•	•	•	•	•	•	•	•
Wi-Fi direct	•	•	•	•	•	•	•	•	•	•
Factory-assigned MAC address in OTP	•	•	•	•	•	•	•	•	•	•
Factory calibrated RF in OTP	•	•	•	•	•	•	•	•	•	•
Simultaneous STA/AP roles	DRCS	DRCS	DRCS	DRCS	•	•	•	DRCS	DRCS	DRCS
Concurrent dual band	•	•			•	•	•			

B = For Bluetooth only
W = For Wi-Fi only

pin = 1 antenna pin for combined Bluetooth and Wi-Fi
2p = 2 antenna pins, one each for Bluetooth and Wi-Fi
3p = 3 pins, 2 for Wi-Fi and 1 for Bluetooth antenna

DRCS = Dynamic Rapid Channel Switching
RSDB = Real Simultaneous Dual Band

o = On request

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