

Stand-alone Bluetooth modules



	Bluetooth									
	NORA-B100	NORA-B101	NORA-B106	NINA-B400	NINA-B406	NINA-B410	NINA-B416	BMD-380	BMD-360	
Grade										
Automotive										
Professional	•	•	•	•	•	•	•			
Standard								•		•
Physical										
Image										
Size [mm]	10.4 × 14.3 × 1.8			10.0 × 15.0 × 2.2				7.5 × 9.5 × 1.5	9.8 × 14.0 × 1.9	
Operating temperature [°C]	-40 to +105			-40 to +105				-40 to +85		
Radio										
Chip inside	nRF5340			nRF52833				nRF52840	nRF52811	
Bluetooth qualification	v5.2	v5.2	v5.2	v5.1	v5.1	v5.1	v5.1	v5.1	v5.1	
Bluetooth low energy	•	•	•	•	•	•	•	•	•	
Thread / Zigbee	•	•	•	•	•			•	•	
NFC	•	•	•	•	•	•	•	•	•	
Max range [meters]	700	700	700	1400	1400	1400	1400	500	200	
Bluetooth output power EIRP [dBm]	8	8	5	10	10	10	10	7	3	
Antenna type (see footnotes)	U.FL	pin	pcb	U.FL	pcb	U.FL	pcb	chip	pcb	
Application software										
u-connectXpress						•	•			
Open CPU for embedded applications	•	•	•	•	•			•	•	
Interfaces										
UART	◆	◆	◆	◆	◆	2	2	◆	◆	
SPI	◆	◆	◆	◆	◆			◆	◆	
I2C	◆	◆	◆	◆	◆			◆	◆	
I2S	◆	◆	◆	◆	◆			◆	◆	
USB	◆	◆	◆	◆	◆			◆	◆	
PDM and PWM	◆	◆	◆	◆	◆			◆	◆	
AD converters [number of bits]	12	12	12	12	12			12	12	
GPIO pins	48	48	48	40	40	28	28	44	32	
Features										
Direction finding (AoA/AoD)	◆	◆	◆	◆	◆	•	•		◆	
Bluetooth long range	◆	◆	◆	◆	◆	•	•	◆	◆	
AT command interface						•	•			
MCU (see footnotes)	Dual-core Arm® Cortex®-M33			M4F	M4F			M4F	M4	
RAM [kB]	512 / 64 *			128	128			256	24	
Flash [kB]	1024 / 256 *			512	512			1024	192	
Arm TrustZone®	◆	◆	◆							
Arm CryptoCell™-312 and KMU	◆	◆	◆							
Low Energy Serial Port Service						•	•			
Simultaneous GATT server and client	◆	◆	◆	◆	◆	•	•	◆	◆	
Throughput [Mbit/s]	1.4	1.4	1.4	1.4	1.4	0.8	0.8	1.4	1.4	
Maximum Bluetooth connections	>20	>20	>20	20	20	8	8	20	4	
Bluetooth mesh	◆	◆	◆	◆	◆			◆	◆	
Secure boot	◆	◆	◆	◆	◆	•	•	◆	◆	
FOTA	◆	◆	◆	◆	◆			◆	◆	

pcb = Internal PCB antenna
pin = Antenna pin
chip = Internal chip antenna

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

◆ = Feature enabled by hardware. The actual support depends on the open CPU application software.
* = Application / Network core with 128 or 64 MHz

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	Bluetooth									
	NINA-B301	NINA-B302	NINA-B306	NINA-B311	NINA-B312	NINA-B316	NINA-B221	NINA-B222	NINA-B111	NINA-B112
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 x 10.6 x 2.2 / 10 x 14 x 3.8			
Operating temperature [°C]	-40 to +85									
Radio										
Chip inside	nRF52840						ESP32		nRF52832	
Bluetooth qualification	v5.0	v5.0	v5.0	v5.0	v5.0	v5.0	v4.2	v4.2	v5.0	v5.0
Bluetooth low energy	•	•	•	•	•	•	•	•	•	•
Bluetooth BR/EDR							•	•		
Thread / Zigbee	•	•	•							
NFC	•	•	•	•	•	•			•	•
Max range [meters]	1400	1400	1400	1400	1400	1400	200	200	350	350
Bluetooth output power EIRP [dBm]	10	10	10	10	10	10	8	8	7	6
Antenna type (see footnotes)	pin	metal	pcb	pin	metal	pcb	pin	metal	pin	metal
Application software										
u-connectXpress				•	•	•	•	•	•	•
Open CPU for embedded applications	•	•	•						•	•
Interfaces										
UART	◆	◆	◆	2	2	2	1	1	1	◆
SPI	◆	◆	◆				1	1	◆	◆
I2C	◆	◆	◆						◆	◆
I2S	◆	◆	◆						◆	◆
USB	◆	◆	◆							
PDM and PWM	◆	◆	◆						◆	◆
AD converters [number of bits]	12	12	12						12	12
GPIO pins	38	38	38	28	28	28	16	16	7	19
Features										
AT command interface				•	•	•	•	•	•	•
MCU (see footnotes)	M4F	M4F	M4F						M4F	M4F
RAM [kB]	256	256	256						64	64
Flash [kB]	1024	1024	1024						512	512
Low Energy Serial Port Service				•	•	•	•	•	•	•
Simultaneous GATT server and client	◆	◆	◆	•	•	•	•	•	•	◆
Throughput [Mbit/s]	1.4	1.4	1.4	0.8	0.8	0.8	1.0	1.0	0.8	1.4
Maximum Bluetooth connections	20	20	20	8	8	8	8	8	7	20
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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Bluetooth										
	ANNA-B112	BMD-340	BMD-341	BMD-345	BMD-350	BMD-301	BMD-300	BMD-330	R41Z	
Grade										
Automotive										
Professional	•									
Standard		•	•	•	•	•	•	•	•	•
Physical										
Image										
Size [mm]	6.5x6.5x1.2	10.2 x 15.0 x 1.9			6.4x8.6x1.5	9.8 x 14.0 x 1.9			10.6x16.2x2.1	
Operating temperature [°C]	-40 to +85									
Radio										
Chip inside	nRF52832	nRF52840			nRF52832			nRF52810	KW41Z	
Bluetooth qualification	v5.0	v5.0	v5.0	v5.0	v5.0	v5.0	v5.0	v5.0	v4.2	
Bluetooth low energy	•	•	•	•	•	•	•	•	•	
Bluetooth BR/EDR										
Thread / Zigbee		•	•	•					•	
NFC	•	•	•	•	•	•	•			
Max range [meters]	160 / 190*	500	750	1000	190	400	200	200	150	
Bluetooth output power EIRP [dBm]	5 / 8*	7	11	18	5	9	3	3	3	
Antenna type (see footnotes)	chip / pin	pcb	U.FL	U.FL	chip	U.FL	pcb	pcb	pcb	
Application software										
u-connectXpress	•									
Open CPU for embedded applications		•	•	•	•	•	•	•	•	
Interfaces										
UART	1	◆	◆	◆	◆	◆	◆	◆	◆	
SPI		◆	◆	◆	◆	◆	◆	◆	◆	
I2C		◆	◆	◆	◆	◆	◆	◆	◆	
I2S		◆	◆	◆	◆	◆	◆			
USB			◆	◆	◆				◆	
PDM and PWM		◆	◆	◆	◆	◆	◆	◆	◆	
AD converters [number of bits]		12	12	12	12	12	12	12	16	
GPIO pins	11	25	48	48	44	32	32	32	25	
Features										
Bluetooth long range			◆	◆	◆					
AT command interface	•									
MCU (see footnotes)		M4F	M4F	M4F	M4F	M4F	M4F	M4F	M4	M0+
RAM [kB]		64	256	256	256	64	64	64	24	128
Flash [kB]		512	1024	1024	1024	512	512	512	192	512
Low Energy Serial Port Service	•									
Simultaneous GATT server and client	•	◆	◆	◆	◆	◆	◆	◆	◆	
Throughput [Mbit/s]	0.8	1.4	1.4	1.4	1.4	1.4	1.4	1.4		
Maximum Bluetooth connections	7	20	20	20	20	20	20	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	v4.2		v4.2			v4.2					
Bluetooth low energy	•	•	•	•	•	•	•	•			
Bluetooth BR/EDR	•	•	•	•	•	•	•	•			
Bluetooth output power EIRP [dBm]	14	11	8	8	8	8	8	8			
Wi-Fi 2.4 / 5 [GHz]	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	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	18	18	18	18	18	18	18	18	
Max Wi-Fi range [meters]	300	250	500	400	400	500	400	400	500	400	
Antenna type (see footnotes)	U.FL	metal	pin	metal	pcb	pin	metal	pcb	pin	metal	
Application software											
u-connectXpress	•	•	•	•	•				•	•	
Open CPU for embedded apps						•	•	•			
Interfaces											
UART	1	1	1	1	1	◆	◆	◆	1	1	
SPI			1	1	1	◆	◆	◆	1	1	
I2C						◆	◆	◆			
I2S						◆	◆	◆			
RMII	1	1	1	1	1	◆	◆	◆	1	1	
GPIO pins	23	23	16	16	18	24	24	26	16	16	
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			
RAM [kB]						520	520	520			
Flash [kB]						2048	2048	4096			
Wi-Fi throughput [Mbit/s]	20	20	13	13	13 *	25	25	25 *	16	16	
Maximum Bluetooth connections	7	7	8	8	8	8	8	8			
Micro Access Point [max stations]	10	10	10	10	10	10	10	10	10	10	
Wi-Fi enterprise security	•	•	•	•	•	◆	◆	◆	•	•	
End-to-end security (TLS)	•	•	•	•	•	◆	◆	◆	•	•	
Secure boot			•	•	•	◆	◆	◆	•	•	
WPA3			•	•	•	◆	◆	◆	•	•	

U.FL = U.FL connector(s) for external antenna
 pin = Antenna pin
 metal = internal metal PIFA antenna
 pcb = Internal PCB antenna

LX6 = 240 MHz dual-core Xtensa LX6
 * = Limited to 8 Mbit/s in Wi-Fi receive

◆ = 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	LILY-W133
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									
Chip inside	NXP SAF5100EL/ TEF5200EL		UBX-P3				NXP 88W8801		
Wi-Fi IEEE 802.11 standards	p	p	p	p	p	p	b/g/n	b/g/n	b/g/n
Wi-Fi 2.4 / 5 [GHz]							2.4	2.4	2.4
LTE filter								•	
Channel width [MHz]	10	10	10 or 20	10 or 20	10/20	10/20	20	20	20
Rx/Tx diversity	•	•		•		•			
Antenna type (see footnotes)	2p	2p	pin	2p	2p	2p	pin	metal	metal
OS support									
Android / Linux	Linux	Linux	Linux	Linux	Linux	Linux	Android and Linux		
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	v2
USB 2.0	1	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	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-W163	JODY-W164	JODY-W167	EMMY-W161	EMMY-W163	EMMY-W165
Grade									
Automotive	•	•	*	•	•	•	•	•	•
Professional	•	•	•				•	•	•
Standard									
Physical									



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 +85		
Radio									
Chip inside	NXP 88Q9098 / NXP 88W9098		NXP 88W8987	CYW 89359			NXP 88W8887A		
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	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	3p	pin	2p	pin
OS support									
Android / Linux drivers	•	•	•	•	•	•	•	•	•
QNX (via third party)				•	•	•	•	•	•
Interfaces									
High-speed UART [®]	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
PCM (Bluetooth audio)	1	1	1	1	1	1	1	1	1
Features									
Bluetooth long range	•	•							
Micro Access Point [max connects]	32	32	8	10	10	10	10	10	10
AES hardware support	•	•	•	•	•	•	•	•	•
Wi-Fi direct	•	•	•	•	•	•	•	•	•
Wi-Fi 802.11mc	•	•							
WPA3	•	•	•						
Factory-assigned MAC address in OTP	•	•	•	•	•	•	•	•	•
Factory calibrated RF in OTP	•	•	•	•	•	•	•	•	•
Simultaneous STA/AP roles	DRCS	DRCS		•	•	•	DRCS	DRCS	DRCS
Concurrent dual band	•	•		•	•	•			

B = Bluetooth only pin = 1 antenna pin for combined Bluetooth and Wi-Fi DRCS = Dynamic Rapid Channel Switching o = On request
W = Wi-Fi only 2p = 2 antenna pins, one each for Bluetooth and Wi-Fi
* = Operating temperature -40 °C to +105 °C 3p = 3 pins, 2 for Wi-Fi and 1 for Bluetooth antenna

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