

# Stand-alone Bluetooth modules



	Bluetooth												
	NORA-B100	NORA-B101	NORA-B106	NORA-B120	NORA-B121	NORA-B126	NINA-B400	NINA-B401	NINA-B406	NINA-B410	NINA-B411	NINA-B416	ANT-B10
<b>Grade</b>													
Automotive													
Professional	•	•	•	•	•	•	•	•	•	•	•	•	•
Standard													
<b>Physical</b>													
<b>Image</b>													
Size [mm]	10.4 × 14.3 × 1.7						10.0 × 15.0 × 2.2 / 10.0 × 11.6 × 2.2						126 × 126
Operating temperature [°C]	-40 to +105						-40 to +105						-40 to +85
<b>Radio</b>													
Chip inside	nRF5340						nRF52833						nRF52833
Bluetooth qualification version	5.2	5.2	5.2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1
Bluetooth Low Energy	•	•	•	•	•	•	•	•	•	•	•	•	•
Thread / Zigbee	•	•	•	•	•	•	•	•	•				
NFC	•	•	•	•	•	•	•	•	•	•	•	•	•
Max range [meters]	700	700	400	1700	1700	1500	1400	1400	1400	1400	1400	1400	70
Bluetooth output power EIRP [dBm]	8	8	5	18	18	15	11	11	11	11	11	11	N.A.
Antenna type (see footnotes)	U,FL	pin	pcb	U,FL	pin	pcb	U,FL	pin	pcb	U,FL	pin	pcb	8 patch elements
<b>Application software</b>													
u-connectLocate													•
u-connectXpress													•
Open CPU for embedded applications	•	•	•	•	•	•	•	•	•				
<b>Interfaces</b>													
UART	◆	◆	◆	◆	◆	◆	◆	◆	◆	2	2	2	1
SPI	◆	◆	◆	◆	◆	◆	◆	◆	◆				1
I2C	◆	◆	◆	◆	◆	◆	◆	◆	◆				
I2S	◆	◆	◆	◆	◆	◆	◆	◆	◆				
USB	◆	◆	◆	◆	◆	◆	◆	◆	◆				1
PDM and PWM	◆	◆	◆	◆	◆	◆	◆	◆	◆				
AD converters [number of bits]	12	12	12	12	12	12	12	12	12				
GPIO pins	48	48	48	46	46	46	40	40	40	28	28	28	3
<b>Features</b>													
Direction finding (AoA/AoD)	◆	◆	◆	◆	◆	◆	◆	◆	◆	•	•	•	•
Bluetooth long range	◆	◆	◆	◆	◆	◆	◆	◆	◆	•	•	•	
AT command interface													•
MCU (see footnotes)	Dual-core Arm® Cortex®-M33						M4F	M4F	M4F				
RAM [kB]	512 + 64 #			512 + 64 #			128	128	128				
Flash [kB]	1024 + 256 #			1024 + 256 #			512	512	512				
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	1.4	1.4	1.4	1.4	0.8	0.8	0.8	0.8
Maximum Bluetooth connections	>20	>20	>20	>20	>20	>20	20	20	20	8	8	8	64
Bluetooth mesh	◆	◆	◆	◆	◆	◆	◆	◆	◆				
Secure boot	◆	◆	◆	◆	◆	◆	◆	◆	◆	•	•	•	•
FOTA	◆	◆	◆	◆	◆	◆	◆	◆	◆				

U,FL = U,FL antenna connector  
pin = Antenna pin  
pcb = Internal PCB antenna  
chip = Internal chip antenna

M4F = 64 MHz Arm® Cortex-M4 with FPU  
KMU = Key management unit  
# = Application + Network cores

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

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# Stand-alone Bluetooth modules



Bluetooth																												
	ANNA-B402		ANNA-B412		ANNA-B112		NINA-B301		NINA-B302		NINA-B306		NINA-B311		NINA-B312		NINA-B316		NINA-B221		NINA-B222		NINA-B111		NINA-B112			
<b>Grade</b>																												
Automotive																												
Professional	•	•			•			•	•			•	•			•	•			•	•			•			•	•
Standard																												
<b>Physical</b>																												
<b>Image</b>																												
Size [mm]	6.5 x 6.5 x 1.2				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 14.0 x 3.8											
Operating temperature [°C]	-40 to +105				-40 to +85				-40 to +85								-40 to +85											
<b>Radio</b>																												
Chip inside	nRF52833				nRF52832				nRF52840								ESP32				nRF52832							
Bluetooth qualification version	5.1	5.1			5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.2	4.2			5.0	5.0			
Bluetooth Low Energy	•	•			•			•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•			
Bluetooth BR/EDR																												
Thread / Zigbee																												
NFC	•	•			•			•	•	•	•	•	•	•	•	•	•	•	•					•	•			
Max range [meters]	800 / 1400*		160 / 190*		1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	200	200			350	350								
Bluetooth output power EIRP [dBm]	9 / 13*		5 / 8*		10	10	10	10	10	10	10	10	10	8	8			7	6									
Antenna type (see footnotes)	chip or pin		chip or pin		pin	metal	pcb	pin	metal	pcb	pin	metal	pcb	pin	metal			pin	metal									
<b>Application software</b>																												
u-connectXpress																												
Open CPU for embedded applications																												
<b>Interfaces</b>																												
UART	◆	2			◆	1			◆	◆	◆	2	2	2	1	1			◆	1	◆	1						
SPI																												
I2C																												
I2S																												
USB																												
PDM and PWM																												
AD converters [number of bits]	12		12		12	12	12									12	12											
GPIO pins	33	19	25	11	38	38	38	28	28	28	16	16	19	7	19	7												
<b>Features</b>																												
Direction finding (AoA/AoD)																												
AT command interface																												
MCU (see footnotes)	M4F		M4F		M4F	M4F	M4F									M4F	M4F											
RAM [kB]	128		64		256	256	256									64	64											
Flash [kB]	512		512		1024	1024	1024									512	512											
Low Energy Serial Port Service																												
Simultaneous GATT server and client																												
Throughput [Mbit/s]	1.4	0.8	1.4	0.8	1.4	1.4	1.4	0.8	0.8	0.8	1.0	1.0	1.4	0.8	1.4	0.8												
Maximum Bluetooth connections	20	8	20	7	20	20	20	8	8	8	8	8	20	7	20	7												
Bluetooth mesh																												
Secure boot																												
FOTA																												

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

M4F = 64 MHz Arm® Cortex-M4 with FPU  
\* = Different values for use with internal or external antenna

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

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# Stand-alone Bluetooth modules



	Bluetooth									
	BMD-360	BMD-380	BMD-340	BMD-341	BMD-345	BMD-350	BMD-301	BMD-300	BMD-330	R41Z
<b>Grade</b>										
Automotive										
Professional										
Standard	•	•	•	•	•	•	•	•	•	•
<b>Physical</b>										
<b>Image</b>										
Size [mm]	9.8 x 14.0 x 1.9	7.5 x 9.5 x 1.5	10.2 x 15.0 x 1.9			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									
<b>Radio</b>										
Chip inside	nRF52811		nRF52840			nRF52832			nRF52810	KW41Z
Bluetooth qualification version	5.1	5.1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.2
Bluetooth Low Energy	•	•	•	•	•	•	•	•	•	•
Thread / Zigbee	•	•	•	•	•					•
NFC		•	•	•	•	•	•	•		
Max range [meters]	200	500	500	750	1700	190	400	200	200	150
Bluetooth output power EIRP [dBm]	3	7	7	11	18	5	9	3	3	3
Antenna type (see footnotes)	pcb	chip	pcb	U.FL	U.FL	chip	U.FL	pcb	pcb	pcb
<b>Application software</b>										
u-connectXpress										
Open CPU for embedded applications	•	•	•	•	•	•	•	•	•	•
<b>Interfaces</b>										
UART	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
SPI	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
I2C	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
I2S		◆	◆	◆	◆	◆	◆	◆		
USB		◆	◆	◆	◆					◆
PDM and PWM	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
AD converters [number of bits]	12	12	12	12	12	12	12	12	12	16
GPIO pins	32	44	48	48	44	32	32	32	32	25
<b>Features</b>										
Direction finding (AoA/AoD)	◆									
Bluetooth long range	◆	◆	◆	◆	◆					
AT command interface										
MCU (see footnotes)	M4	M4F	M4F	M4F	M4F	M4F	M4F	M4F	M4	M0+
RAM [kB]	24	256	256	256	256	64	64	64	24	128
Flash [kB]	192	1024	1024	1024	1024	512	512	512	192	512
Low Energy Serial Port Service										
Simultaneous GATT server and client	◆	◆	◆	◆	◆	◆	◆	◆	◆	
Throughput [Mbit/s]	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	
Maximum Bluetooth connections	4	20	20	20	20	20	20	20	4	2
Bluetooth mesh		◆	◆	◆	◆	◆	◆	◆		
Secure boot		◆	◆	◆	◆					
FOTA	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆

pin = Antenna pin  
pcb = Internal PCB 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	NORA-W101	NORA-W106	NORA-W251AWS	NORA-W256AWS	NINA-W151	NINA-W152	NINA-W156	NINA-W101	NINA-W102	NINA-W106	NINA-W131	NINA-W132
<b>Grade</b>															
Automotive															
Professional	•	•		•	•	•	•	•	•	•	•	•	•	•	•
Standard															
<b>Physical</b>															
<b>Image</b>															
Size [mm]	14.8 x 22.3 x 3.2/4.7			10.4 x 14.3 x 1.8				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														
<b>Radio</b>															
Chip inside	WL1837		ESP32-S3		ESP32-S3		ESP32			ESP32			ESP32		
Bluetooth qualification version	4.2		5.0		5.0		4.2			4.2					
Bluetooth Low Energy	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Bluetooth BF/EDR	•	•					•	•	•	•	•	•	•	•	•
Bluetooth output power EIRP [dBm]	14	11	8	8	8	8	8	8	8	8	8	8	8	8	8
Wi-Fi 2.4 / 5 [GHz]	2.4 and 5		2.4	2.4	2.4	2.4	2.4	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		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	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	18	18	18	18	18
Max Wi-Fi range [meters]	300	250	500*	500*	500*	500*	500	400	400	500	400	400	500	400	400
Antenna type (see footnotes)	U.FL	metal	pin	pcb	pin	pcb	pin	metal	pcb	pin	metal	pcb	pin	metal	metal
<b>Application software</b>															
AWS IoT ExpressLink					•	•									
u-connectXpress	•	•						•	•	•				•	•
Open CPU for embedded apps			•	•							•	•	•		
<b>Interfaces</b>															
UART	1	1	◆	◆	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	38	38			16	16	18	24	24	26	16	16	16
AD converters [number of bits]			12	12						12	12	12			
<b>Features</b>															
AT command interface	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Point-to-Point Protocol	•	•					•	•	•	◆	◆	◆	◆	•	•
Low Energy Serial Port Service	•	•					•	•	•	◆	◆	◆	◆		
MCU (see footnotes)			LX7	LX7	LX7	LX7	LX6	LX6	LX6	LX6	LX6	LX6	LX6	LX6	LX6
RAM [kB]			512	512	512	512	520	520	520	520	520	520	520	520	520
Flash [MB]			8	8	8	8	2	2	2	2	2	2	4	8	8
Wi-Fi throughput [Mbit/s]	20	20	150	150	20	20	13	13	13	25	25	25	25	16	16
Maximum Bluetooth connections	7	7	7	7	1	1	8	8	8	8	8	8	8	8	8
Micro Access Point [max stations]	10	10	10	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  
LX7 = 240 MHz dual-core Xtensa LX7  
\* = Estimated value

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



# Host-based short range radio modules



	Wi-Fi			Multiradio (Wi-Fi and Bluetooth)											
	LILY-W131	LILY-W132	LILY-W133	MAYA-W160	MAYA-W161	MAYA-W166	M2-MAYA-W161	M2-MAYA-W166	MAYA-W260	MAYA-W261	MAYA-W266	MAYA-W271	MAYA-W276	M2-MAYA-W271	
<b>Grade</b>															
Automotive															
Professional	•	•	•	•	•	•			•	•	•	•	•		
Standard							•	•						•	
<b>Physical</b>															
<b>Image</b>															
Size [mm]	10.0 x 14.0 x 2.2 / 3.8			10.4 x 14.3 x 1.9			22 x 30 x 2.8		10.4 x 14.3 x 1.9					22 x 30 x 2.8	
Operating temperature [°C]	-40 to +85														
<b>Radio</b>															
Chip inside	NXP 88W8801			NXP IW416			NXP IW416		NXP IW611			NXP IW612		NXP IW612	
Bluetooth qualification version				5.1 (full features)			5.2		5.2					5.2	
Bluetooth profiles				HCI			HCI		HCI					HCI	
Bluetooth BR/EDR				• • •			• •		• • • • •			• • • • •		•	
Bluetooth Low Energy				• • •			• •		• • • • •			• • • • •		•	
Bluetooth output power conducted [dBm]				10 10 10			10 10		<20 <20 <20 <20 <20			<20 <20 <20 <20 <20		10	
Wi-Fi output power EIRP [dBm]	19 15 15			18 18 18			18 18		18 18 18 18 18			18 18 18 18 18		18	
Wi-Fi IEEE 802.11 standards	b/g/n			a/b/g/n			a/b/g/n		Wi-Fi 6 (a/b/g/n/ac/ax)						
Wi-Fi 2.4 / 5 [GHz]	2.4			2.4 and 5			2.4 and 5		2.4 and 5					2.4 and 5	
LTE filter	•														
Antenna type (see footnotes)	pin	metal	metal	2 U.FL	2 pin	pcb	2 U.FL	pcb	2 U.FL	2 pin	pcb/pin	2 pin	pcb/pin	2 U.FL	
Channel width [MHz]	20	20	20	20 in 2.4 GHz band, 20/40 in 5 GHz band					80	80	80	80	80	80	
<b>OS support</b>															
Android / Linux drivers	• • •			• • •			• •		• • • • •			• • • • •		•	
RTOS (via NXP i.MX RT MCUs)	• • •			• • •			• •		• • • • •			• • • • •		•	
QNX (via third party)															
<b>Interfaces</b>															
High-speed UART <sup>®</sup>				1 1 1			1 1		1 1 1 1 1 1			1 1 1 1 1		1	
USB 2.0	1 1 1														
SDIO [version] <sup>™</sup>	v2	v2	v2	v3	v3	v3	v3	v3	v3	v3	v3	v3	v3	v3	
PCM/I2S (Bluetooth audio)				1 1 1			1 1		1 1 1 1 1 1			1 1 1 1 1		1	
<b>Features</b>															
Bluetooth long range				• • •											
Micro Access Point [max connects]	8	8	8	8	8	8	8	8	16	16	16	16	16	16	
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									• • • • •			• • • • •		•	
Secure boot									• • • • •			• • • • •		•	

B = Bluetooth only  
W = Wi-Fi only

pin = pin for external antenna  
metal = Metal PIFA antenna

U.FL = U.FL connector(s) for external antenna  
pcb = Internal PCB antenna

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# Host-based short range radio modules



	Multiradio (Wi-Fi and Bluetooth)																							
	JODY-W374		JODY-W377		M2-JODY-W377			JODY-W263		M2-JODY-W263			JODY-W163		JODY-W164		JODY-W167		EMMY-W161		EMMY-W163		EMMY-W165	
<b>Grade</b>																								
Automotive	•		•					•					•		•		•		•		•		•	
Professional	•		•					•											•		•		•	
Standard					•					•											•		•	
<b>Physical</b>																								
<b>Image</b>																								
Size [mm]	13.8 x 19.8 x 2.5			22 x 30 x 2.8			13.8 x 19.8 x 2.5			22 x 30 x 2.8			13.8 x 19.8 x 2.5			13.8 x 19.8 x 2.5								
Operating temperature [°C]	-40 to +85																							
<b>Radio</b>																								
Chip inside	NXP 88Q9098 / NXP 88W9098			NXP 88Q9098			NXP 88W8987			NXP 88W8987			CYW 89359			NXP 88W8887A								
Bluetooth qualification version	5.3			5.3			5.0			5.0			5.0 (w/o optional features)			4.2								
Bluetooth profiles	HCI			HCI			HCI			HCI			HCI			HCI								
Bluetooth BR/EDR	•		•		•			•			•			•		•		•		•		•		
Bluetooth Low Energy	•		•		•			•			•			•		•		•		•		•		
Bluetooth output power conducted [dBm]	10		10		10			10			10			10		10		10		10		10		
Wi-Fi output power conducted [dBm]	19		19		19			18			18			18		18		18		18		18		
Wi-Fi IEEE 802.11 standards	Wi-Fi 6 (802.11ax)			Wi-Fi 6 (802.11ax)			a/b/g/n/ac			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			2.4 and 5			2.4 and 5		2.4 and 5								
LTE filter	o		o		o			o			o			o		o		•						
Antenna type (see footnotes)	2p		3p		3 U.FL			2p		2 U.FL			2p		2p		3p		pin		2p		pin	
<b>OS support</b>																								
Android / Linux drivers	•		•		•			•			•			•		•		•		•		•		
RTOS (via NXP i.MX RT MCUs)								•			•									•		•		
QNX (via third party)														•		•		•		•		•		
<b>Interfaces</b>																								
High-speed UART <sup>®</sup>	1		1		1			1			1			1		1		1		1		1		
PCIe <sup>W</sup>	1		1		1									1		1								
SDIO [version] <sup>W</sup>	v3		v3		v3			v3			v3			v3		v3		v3		v3		v3		
PCM/I2S (Bluetooth audio)	1		1		1			1			1			1		1		1		1		1		
<b>Features</b>																								
Bluetooth long range	•		•		•																			
Micro Access Point [max connects]	32		32		64			8			8			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	•		•		•			•			•			•		•		•		•		•		
Concurrent dual band	•		•		•			•			•			•		•		•		•		•		

B = Bluetooth only  
W = 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

U.FL = U.FL connector(s) for external antenna  
o = On request

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