

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	
Grade													
Automotive													
Professional	•	•	•	•	•	•	•	•	•	•	•	•	
Standard													
Physical													
Image													
Size [mm]	10.4 × 14.3 × 1.7						10.0 × 15.0 × 2.2 / 10.0 × 11.6 × 2.2						
Operating temperature [°C]	-40 to +105						-40 to +105						
Radio													
Chip inside	nRF5340						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	
Bluetooth Low Energy	•	•	•	•	•	•	•	•	•	•	•	•	
Thread / Zigbee	•	•	•	•	•	•	•	•	•				
NFC	•	•	•	•	•	•	•	•	•	•	•	•	
Max range [meters]	700	700	700	1500	1500	1500	1400	1400	1400	1400	1400	1400	
Bluetooth output power EIRP [dBm]	8	8	5	18	18	15	11	11	11	11	11	11	
Antenna type (see footnotes)	U,FL	pin	pcb	U,FL	pin	pcb	U,FL	pin	pcb	U,FL	pin	pcb	
Application software													
u-connectXpress											•	•	•
Open CPU for embedded applications	•	•	•	•	•	•	•	•	•				
Interfaces													
UART	◆	◆	◆	◆	◆	◆	◆	◆	◆	2	2	2	
SPI	◆	◆	◆	◆	◆	◆	◆	◆	◆				
I2C	◆	◆	◆	◆	◆	◆	◆	◆	◆				
I2S	◆	◆	◆	◆	◆	◆	◆	◆	◆				
USB	◆	◆	◆	◆	◆	◆	◆	◆	◆				
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	
Features													
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	
Maximum Bluetooth connections	>20	>20	>20	>20	>20	>20	20	20	20	8	8	8	
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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	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										
Grade																																			
Automotive																																			
Professional	•	•			•			•	•			•	•			•	•			•	•			•			•	•							
Standard																																			
Physical																																			
Image																																			
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																						
Radio																																			
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	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0							
Bluetooth Low Energy	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•							
Bluetooth BR/EDR																																			
Thread / Zigbee																																			
NFC	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•							
Max range [meters]	600 / 700*		160 / 190*		1400		1400		1400		1400		1400		1400		1400		200		200		350		350										
Bluetooth output power EIRP [dBm]	9 / 11*		5 / 8*		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		pin		metal												
Application software																																			
u-connectXpress																																			
Open CPU for embedded applications																																			
Interfaces																																			
UART	◆	2	◆	1	◆	◆	◆	2	2	2	1	1	◆	1	◆	1	◆	1																	
SPI	◆		◆		◆	◆					1	1	◆		◆		◆																		
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																			
Features																																			
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.

Stand-alone Bluetooth modules



	Bluetooth									
	BMD-360	BMD-380	BMD-340	BMD-341	BMD-345	BMD-350	BMD-301	BMD-300	BMD-330	R41Z
Grade										
Automotive										
Professional										
Standard	•	•	•	•	•	•	•	•	•	•
Physical										
Image										
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									
Radio										
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	1000	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
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	12	12	12	16
GPIO pins	32	44	48	48	44	32	32	32	32	25
Features										
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- W251AWS	NORA- W256AWS	NINA-W151	NINA-W152	NINA-W156	NINA-W101	NINA-W102	NINA-W106	NINA-W131	NINA-W132
Grade												
Automotive												
Professional	•	•	•	•	•	•	•	•	•	•	•	•
Standard												
Physical												



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											
Radio												
Chip inside	WL1837		ESP32-S3		ESP32			ESP32			ESP32	
Bluetooth qualification version	4.2		5.0		4.2			4.2				
Bluetooth Low Energy	•	•	•	•	•	•	•	•	•	•		
Bluetooth BR/EDR	•	•			•	•	•	•	•	•		
Bluetooth output power EIRP [dBm]	14	11	8	8	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	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	b/g/n	b/g/n
Wi-Fi output power EIRP [dBm]	18	15	18*	18*	18	18	18	18	18	18	18	18
Max Wi-Fi range [meters]	300	250	500*	500*	500	400	400	500	400	400	500	400
Antenna type (see footnotes)	U.FL	metal	pin	pcb	pin	metal	pcb	pin	metal	pcb	pin	metal
Application software												
AWS IoT ExpressLink			•	•								
u-connectXpress	•	•			•	•	•				•	•
Open CPU for embedded apps								•	•	•		
Interfaces												
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			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)			LX7	LX7				LX6	LX6	LX6		
RAM [kB]			512	512				520	520	520		
Flash [MB]			8	8				2	2	4/8		
Wi-Fi throughput [Mbit/s]	20	20	20	20	13	13	13	25	25	25	16	16
Maximum Bluetooth connections	7	7	1	1	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
 LX7 = 240 MHz dual-core Xtensa LX7
 * = Estimated value

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

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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
Grade						
Automotive						
Professional	•	•	•	•	•	•
Standard						
Physical						



Size [mm]	10.0 x 14.0 x 2.2 / 3.8			10.4 x 14.3 x 2.5		
Operating temperature [°C]	-40 to +85			-40 to +85		
Radio						
Chip inside	NXP 88W8801			NXP IW416		
Bluetooth qualification version				5.1 (full features)		
Bluetooth profiles				HCI		
Bluetooth BR/EDR				•	•	•
Bluetooth Low Energy				•	•	•
Bluetooth output power conducted [dBm]				10	10	10
Wi-Fi output power EIRP [dBm]	19	15	15	18	18	18
Wi-Fi IEEE 802.11 standards	b/g/n	b/g/n	b/g/n	a/b/g/n	a/b/g/n	a/b/g/n
Wi-Fi 2.4 / 5 [GHz]	2.4	2.4	2.4	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 pins	pcb
Channel width [MHz]	20	20	20	20 in 2.4 GHz band, 20/40 in 5 GHz band		
OS support						
Android / Linux drivers	•	•	•	•	•	•
RTOS (via NXP i.MX RT MCUs)	•	•	•	•	•	•
Interfaces						
High-speed UART ^B				1	1	1
USB 2.0	1	1	1			
SDIO [version] ^W	v2	v2	v2	v3	v3	v3
PCM/I2S (Bluetooth audio)				1	1	1
Features						
Bluetooth long range				•	•	•
Micro Access Point [max connects]	8	8	8	8	8	8
AES hardware support	•	•	•	•	•	•
Wi-Fi direct	•	•	•	•	•	•
Wi-Fi 802.11mc				•	•	•
WPA3	•	•	•	•	•	•
Factory-assigned MAC address in OTP	•	•	•	•	•	•
Factory calibrated RF in OTP	•	•	•	•	•	•

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	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 version	5.1		5.2	5.0 (without optional features)			4.2		
Bluetooth profiles	HCI		HCI	HCI			HCI		
Bluetooth BR/EDR	•	•	•	•	•	•	•	•	•
Bluetooth Low Energy	•	•	•	•	•	•	•	•	•
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
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		•		
Antenna type (see footnotes)	2p	3p	2p	2p	2p	3p	pin	2p	pin
OS support									
Android / Linux drivers	•	•	•	•	•	•	•	•	•
QNX (via third party)				•	•	•	•	•	•
RTOS via i.MX RT MCU			•						
Interfaces									
High-speed UART ^B	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/I2S (Bluetooth audio)	1	1	1	1	1	1	1	1	1
Features									
Bluetooth long range	•	•							
Micro Access Point [max connects]	64	64	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	•	•	•	•	•	•	•	•	•
Concurrent dual band	•	•		•	•	•			

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

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