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RE: Certification Application
Model: NINA-B311, NINA-B312
IC : 8595A-NINAB31
FCC ID: XPYNINAB31

Operational description of OEM-Bluetooth low energy module series NINA-B31

The u-blox NINA-B31 series are small sized radio modules intended for OEM integration utilizing Bluetooth 5, IEEE 802.15.4, 2.4 GHz proprietary mode and/or NFC. All 2.4 GHz RF-signals share the same RF-path thus it is not possible to transmit e.g. BLE and 802.15.4 signals simultaneously. The NFC receiver uses its own interface. It is intended to function as a short-range radio link transmitting and receiving information between portable and/or fixed electronic devices.

The NFC interface is passive, supporting tag functionality only, and requires an external 13.56 MHz antenna to operate. An external NFC field is required to activate the NFC block of the module.

The following two different antenna options (hardware options) are available for the NINA-B31 modules:

- NINA-B311 with the RF-port presented at a solder land to be connected to an external antenna connector using the external antenna reference design (see separate document for more info). Different types of approved external antennas are available and can be used. See Table 2 for a list of approved antennas.
- NINA-B312 equipped with an integral antenna.

2.4 GHz radio		Nordic Semiconductor nRF52840
Bluetooth low energy	RF output power	Typical 8 dBm at antenna port
	Data rate	1 Mbps, 2 Mbps, 500 kbps, 125 kbps
	Frequencies	2402 – 2480 MHz
	Channels	40 channels, numbered 0 – 39 2 MHz separation
IEEE 802.15.4	RF output power	Typical 8 dBm at antenna port
	Data rate	250 kbps
	Frequencies	2405 – 2475 MHz
	Channels	24 channels, numbered 11-25 5 MHz separation
2.4 GHz proprietary modes	RF output power	Typical 8 dBm at antenna port
	Data rate	1 Mbps, 2 Mbps
	Frequencies	2402 – 2480 MHz
	Channels*	79 channels, 1 MHz separation
NFC receiver		Nordic Semiconductor nRF52840
NFC	RF output power	Receive only, load modulation is used to 'transmit' data.
	Data rate	106 kbps
	Frequencies	13.65 MHz
	Channels	1 channel

*Depends on selected protocol

Table 1: Radio data

Configuration and software security

The NINA-B31 series modules fulfil the requirements of 594280 D01 Software Configuration Control v02r01. The module has it's RF-parameters, channel list, power settings etc. stored in non-volatile memory inside the radio chip, and is controlled by the application software which is pre-flashed by u-blox. A host system or end-user cannot configure the NINA-B31 module to be non-compliant to regulatory restrictions.

The NINA-B31 modules provide secure boot, which ensures the module only boots up with original u-blox software.

Block diagram

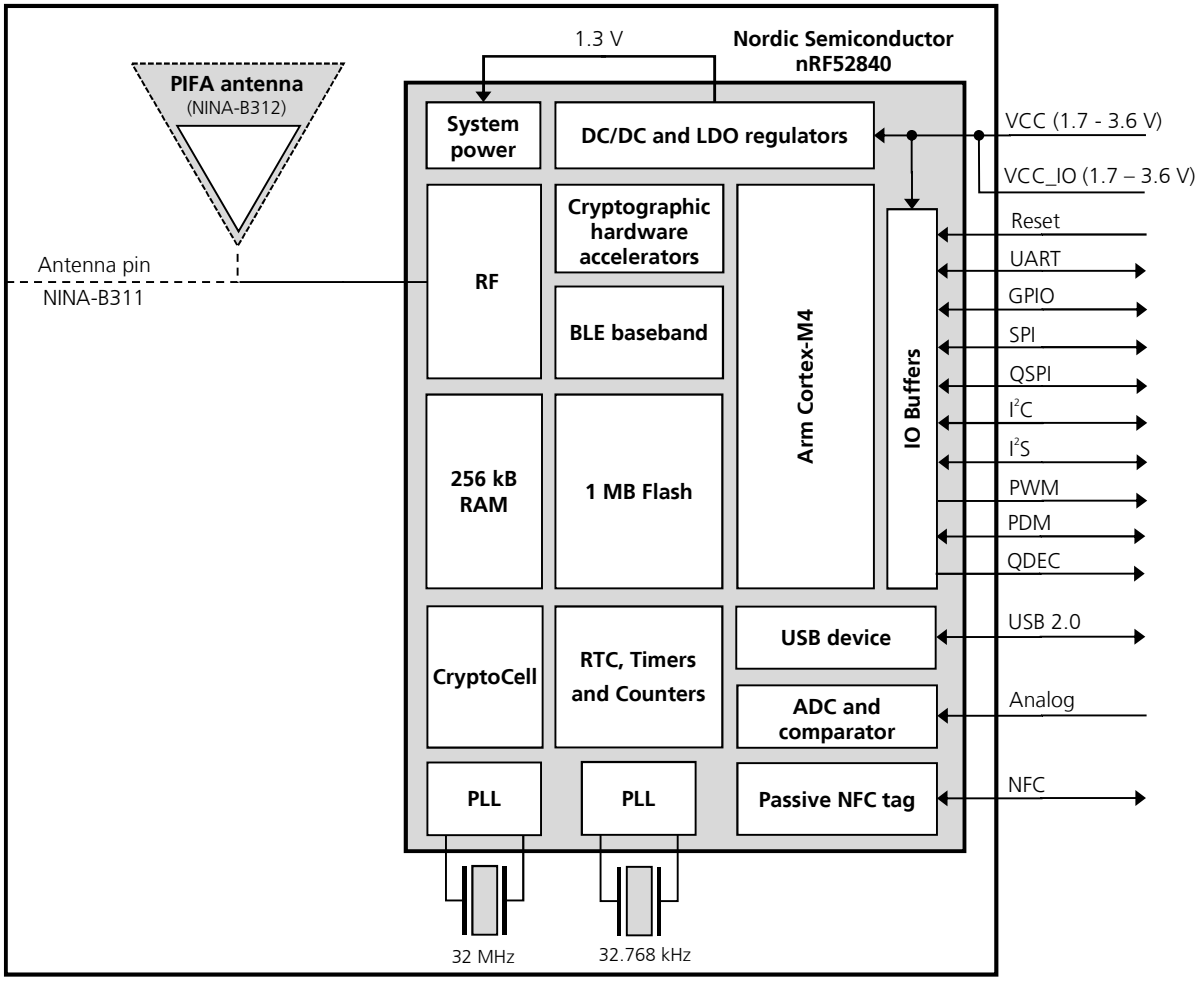

Figure 1: NINA-B31 series block diagram

List of antennas

#	Antenna name	Manufacturer	Comment	Gain [dBi]
1	u-blox LILY Antenna	ProAnt	SMD PIFA antenna on NINA-B312	+3
2	InSide-2400	ProAnt	Patch, 10cm cable/U.FL	+3
3	Ex-IT 2400 -RP-SMA 28-001 -MHF 28-001	ProAnt	Monopole, RP-SMA 10 cm cable/U.FL	+3
4	Ex-IT 2400 -RP-SMA 70-002	ProAnt	Monopole, RP-SMA	+3
5	FlatWhip-2400	ProAnt	Monopole, RP-SMA	+3

Table 2: Antennas to be used with the NINA-B31 series