# NEO-M9N

## u-blox M9 standard precision module

Data sheet


**Abstract**

Technical data sheet describing the u-blox NEO-M9N module. NEO-M9N offers ultra-robust meter-level GNSS positioning performance with concurrent reception of up to four GNSS (GPS, GLONASS, BeiDou, Galileo) in a 12.2 x 16.0 mm package.

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# Document information

| | | |
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| **Title** | **NEO-M9N** | |
| **Subtitle** | u-blox M9 standard precision module | |
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| **In development / prototype** | Objective specification | Target values. Revised and supplementary data will be published later. |
| **Engineering sample** | Advance information | Data based on early testing. Revised and supplementary data will be published later. |
| **Initial production** | Early production information | Data from product verification. Revised and supplementary data may be published later. |
| **Mass production / End of life** | Production information | Document contains the final product specification. |

This document applies to the following products:

| **Product name** | **Type number** | **Firmware version** | **PCN reference** |
|---|---|---|---|
| NEO-M9N | NEO-M9N-00B-00 | SPG 4.00 | N/A |

# Contents

# 1 Functional description

## 1.1 Overview

The NEO-M9N GNSS receiver features the u-blox M9 standard precision GNSS platform, and provides exceptional sensitivity and acquisition times for all L1 GNSS systems. u-blox M9 receivers are available in different variants to serve automotive and industrial tracking applications, such as navigation, telematics and UAVs.

The u-blox M9 standard precision GNSS platform, which delivers meter-level accuracy, succeeds the well-known u-blox M8 product range.

u-blox M9 receivers support concurrent reception of four GNSS. The high number of visible satellites allows the receiver to select the best signals. This maximizes the position accuracy, in particular under challenging conditions such as deep urban canyons.

u-blox M9 receivers detect jamming and spoofing events and report them to the host, which allows the system to react to such events. Advanced filtering algorithms mitigate the impact of RF interference and jamming, thus enabling the product to operate as intended.

The receiver also provides higher navigation rate and improved security features compared to previous u-blox GNSS generations.

The NEO-M9N module is available in the 12.2 x 16.0 mm NEO form factor LCC package.

## 1.2 Performance

| Parameter | Specification | |
|---|---|---|
| Receiver type | Multi-constellation GNSS standard precision receiver | |
| Accuracy of time pulse signal | RMS<br>99% | 30ns<br>60ns |
| Frequency of time pulse signal | | 0.25 Hz to 10 MHz (configurable) |
| Operational limits[1] | Dynamics<br>Altitude<br>Velocity | ≤ 4 g<br>80,000 m<br>500 m/s |
| Velocity accuracy[2] | | 0.05 m/s |
| Dynamic heading accuracy | | 0.3 deg |

| GNSS | | GPS+GLO+GAL+BDS | GPS+GLO+GAL | GPS+GLO | GPS+BDS | GPS+GAL |
|---|---|---|---|---|---|---|
| Acquisition[3] | Cold start | 24 s | 25 s | 26 s | 28 s | 29 s |
| | Hot start | 2 s | 2 s | 2 s | 2 s | 2 s |
| | Aided start[4] | 2 s | 2 s | 2 s | 2 s | 2 s |
| Nav. update rate | PVT | 25 Hz | 25 Hz | 25 Hz | 25 Hz | 25 Hz |

1 Assuming Airborne 4 g platform

2 50% @ 30 m/s for dynamic operation

3 Commanded starts. All satellites at -130 dBm. GPS always in combination with QZSS and SBAS. Measured at room temperature.

4 Dependent on the speed and latency of the aiding data connection, commanded starts.

| GNSS | | GPS+GLO+GAL+BDS | GPS+GLO+GAL | GPS+GLO | GPS+BDS | GPS+GAL |
|---|---|---|---|---|---|---|
| Sensitivity[5] | Tracking and nav. | -167 dBm | -167 dBm | -167 dBm | -166 dBm | -166 dBm |
| | Reacquisition | -160 dBm | -160 dBm | -160 dBm | -160 dBm | -160 dBm |
| | Cold start | -148 dBm | -148 dBm | -148 dBm | -148 dBm | -148 dBm |
| | Hot start | -159 dBm | -159 dBm | -159 dBm | -159 dBm | -159 dBm |
| Position accuracy | PVT | 2.0 m CEP | 2.0 m CEP | 2.0 m CEP | 2.0 m CEP | 2.0 m CEP |

**Table 1: NEO-M9N typical performance in multi-constellation GNSS modes**

| GNSS | | GPS | GLONASS | BEIDOU | GALILEO |
|---|---|---|---|---|---|
| Acquisition[3] | Cold start | 29 s | 27 s | 32 s | 42 s |
| | Hot start | 2 s | 2 s | 2 s | 2 s |
| | Aided start[4] | 2 s | 2 s | 2 s | 2 s |
| Nav. update rate | PVT | 25 Hz | 25 Hz | 25 Hz | 25 Hz |
| Sensitivity[5] | Tracking and nav. | -166 dBm | -164 dBm | -160 dBm | -159 dBm |
| | Reacquisition | -160 dBm | -155 dBm | -157 dBm | -154 dBm |
| | Cold start | -148 dBm | -145 dBm | -145 dBm | -140 dBm |
| | Hot start | -159 dBm | -156 dBm | -159 dBm | -154 dBm |
| Position accuracy | PVT | 2.0 m CEP | 4.0 m CEP | 3.0 m CEP | 3.0 m CEP |

**Table 2: NEO-M9N typical performance in single-GNSS modes**

## 1.3 Supported GNSS constellations

The NEO-M9N is a concurrent GNSS receiver which can receive and track multiple GNSS systems. Owing to the multi-band RF front-end architecture all four major GNSS constellations, GPS, Galileo, GLONASS and BeiDou can be received concurrently. The NEO-M9N receiver can be configured for concurrent GPS, GLONASS, Galileo and BeiDou plus SBAS and QZSS reception. If power consumption is a key factor, then the receiver can be configured for a sub-set of GNSS constellations.

The NEO-M9N supports the GNSS and their signals as shown in Table 3.

| GPS | GLONASS | Galileo | BeiDou |
|---|---|---|---|
| L1C/A (1575.42 MHz) | L1OF (1602 MHz + k*562.5 kHz, k = –7,..., 5, 6) | E1-B/C (1575.42 MHz) | B1I (1561.098 MHz) |

**Table 3: Supported GNSS and signals on NEO-M9N**

The following GNSS assistance services can be activated on NEO-M9N:

| AssistNow™ Online | AssistNow™ Offline | AssistNow™ Autonomous |
|---|---|---|
| Supported | Supported | Supported |

**Table 4: Supported Assisted GNSS (A-GNSS) Services**

NEO-M9N supports the following augmentation systems:

| SBAS | QZSS | IMES | Differential GNSS |
|---|---|---|---|
| EGNOS, GAGAN, MSAS and WAAS supported | L1s (SAIF) supported | Not supported | RTCM 3.3 |

**Table 5: Supported Augmentation Systems of NEO-M9N**

☞ The augmentation systems SBAS and QZSS can be enabled only if GPS operation is also enabled.

[5] Demonstrated with a good external LNA. Measured at room temperature.

## 1.4 Supported protocols

The NEO-M9N supports the following protocols:

| Protocol | Type |
|---|---|
| UBX | Input/output, binary, u-blox proprietary |
| NMEA 4.10 | Input/output, ASCII |
| RTCM 3.3 | Input only, binary |

**Table 6: Supported protocols**

For specification of the protocols, see the u-blox NEO-M9N Interface description [2].

## 1.5 Firmware features

| Feature | Description |
|---|---|
| Assisted GNSS | AssistNow Online, AssistNow Offline and AssistNow Autonomous supported |
| Backup modes | Hardware backup mode, software backup mode |
| Data batching | Autonomous tracking up to 5 min |
| Data-logger | Position, velocity, time, and odometer data |
| Geo-fencing | Up to 4 circular areas |
| Power save modes | On/off, cyclic |
| Odometer | Measure traveled distance with support for different user profiles |
| Upgradeable firmware | Firmware can be upgraded via host upload or updated in the internal flash memory. |

**Table 7: Firmware features**

| Feature | Description |
|---|---|
| Anti-jamming | RF interference and jamming detection and reporting; Active GNSS in-band filtering |
| Anti-spoofing | Spoofing detection and reporting |
| Configuration lockdown | Receiver configuration can be locked by command |
| Message integrity | All messages signed with SHA-256 |
| Secure boot | Only signed FW images executed |

**Table 8: Security features**

# 2 System description

## 2.1 Block diagram

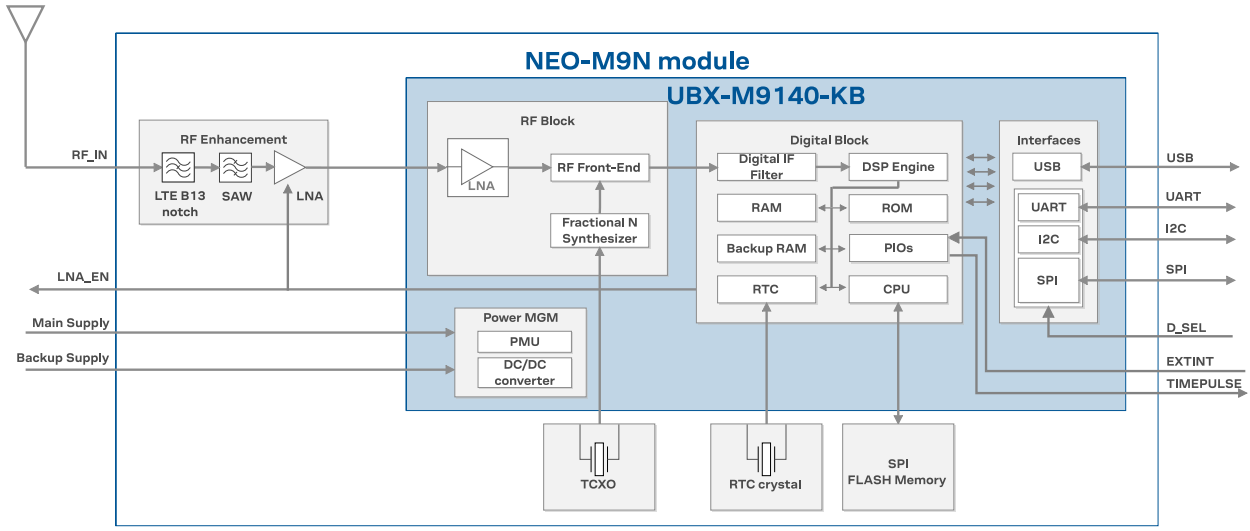



**Figure 1: NEO-M9N block diagram**

# 3 Pin definition

## 3.1 Pin assigment

The pin assignment of the NEO-M9N module is shown in Figure 2. The defined configuration of the PIOs is listed in Table 9.

For detailed information on pin functions and characteristics, see the u-blox NEO-M9N Integration manual [1].

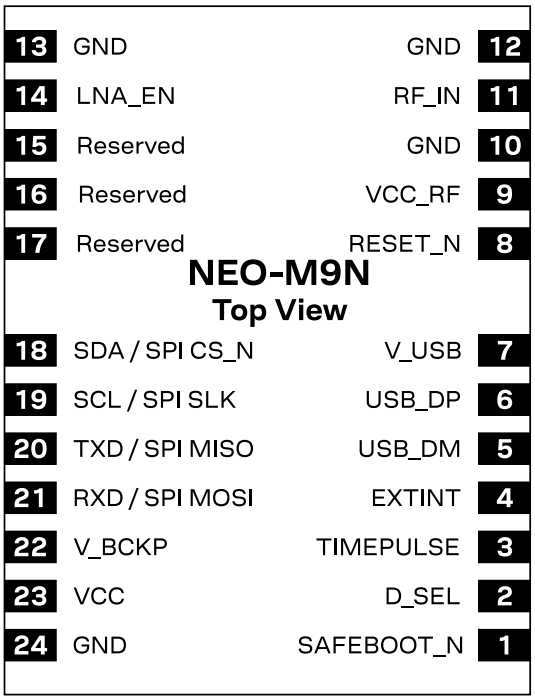



**Figure 2: NEO-M9N pin assignment**

| Pin No | Name | I/O | Description |
|---|---|---|---|
| 1 | SAFEBOOT_N | I | SAFEBOOT_N (used for FW updates and reconfiguration, leave open) |
| 2 | D_SEL | I | Interface select (open or VCC = UART + I2C; GND = SPI) |
| 3 | TIMEPULSE | O | TIMEPULSE (1 PPS) |
| 4 | EXTINT | I | EXTINT (PIO 7) |
| 5 | USB_DM | I/O | USB data (DM) |
| 6 | USB_DP | I/O | USB data (DP) |
| 7 | V_USB | I | USB Supply |
| 8 | RESET_N | I | RESET (active low) |
| 9 | VCC_RF | O | Voltage for external LNA |
| 10 | GND | I | Ground |
| 11 | RF_IN | I | GNSS signal input |
| 12 | GND | I | Ground |
| 13 | GND | I | Ground |
| 14 | LNA_EN | O | Antenna/LNA control |
| 15 | Reserved | - | Reserved |

| Pin No | Name | I/O | Description |
|---|---|---|---|
| 16 | Reserved | - | Reserved |
| 17 | Reserved | - | Reserved |
| 18 | SDA / SPI CS_N | I/O | I2C data if D_SEL = VCC (or open); SPI chip select if D_SEL = GND |
| 19 | SCL / SPI SLK | I/O | I2C clock if D_SEL = VCC (or open); SPI clock if D_SEL = GND |
| 20 | TXD / SPI MISO | O | UART output if D_SEL = VCC (or open); SPI MISO if D_SEL = GND |
| 21 | RXD / SPI MOSI | I | UART input if D_SEL = VCC (or open); SPI MOSI if D_SEL = GND |
| 22 | V_BCKP | I | Backup voltage supply |
| 23 | VCC | I | Supply voltage |
| 24 | GND | I | Ground |

**Table 9: NEO-M9N pin assigment**

For detailed information on the pin functions and characteristics see the u-blox NEO-M9N Integration manual [1].

# 4 Electrical specification

The limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only. Operation of the device at these or at any other conditions above those given below is not implied. Exposure to limiting values for extended periods may affect device reliability.

Where application information is given, it is advisory only and does not form part of the specification.

For detailed information on the device integration, see the u-blox NEO-M9N Integration manual [1].

## 4.1 Absolute maximum ratings

| Parameter | Symbol | Condition | Min | Max | Units |
|---|---|---|---|---|---|
| Power supply voltage | VCC | | -0.5 | 3.6 | V |
| Backup battery voltage | V_BCKP | | -0.5 | 3.6 | V |
| Input pin voltage | Vin | VCC ≤ 3.1 V | -0.5 | VCC + 0.5 | V |
| | | VCC > 3.1 V | -0.5 | 3.6 | V |
| VCC_RF output current | ICC_RF | | | 100 | mA |
| Supply voltage USB | V_USB | | –0.5 | 3.6 | V |
| USB signals | USB_DN, USB_DP | | -0.5 | V_USB + 0.5 | V |
| Input power at RF_IN | Prfin | source impedance = 50 Ω, continuous wave | | 13[6] | dBm |
| Storage temperature | Tstg | | -40 | +85 | °C |

**Table 10: Absolute maximum ratings**

The product is not protected against overvoltage or reversed voltages. Voltage spikes exceeding the power supply voltage specification, given in the table above, must be limited to values within the specified boundaries by using appropriate protection diodes.

## 4.2 Operating conditions

All specifications are at an ambient temperature of 25 °C. Extreme operating temperatures can significantly impact the specification values. Applications operating near the temperature limits should be tested to ensure the specification.

| Parameter | Symbol | Min | Typical | Max | Units | Condition |
|---|---|---|---|---|---|---|
| Power supply voltage | VCC | 2.7 | 3.0 | 3.6 | V | |
| Backup battery voltage | V_BCKP | 1.65 | | 3.6 | V | |
| Backup battery current | I_BCKP | | 36 | | µA | |
| SW backup current | I_SWBCKP | | 0.33 | | mA | |
| Input pin voltage range | Vin | 0 | | VCC | V | |
| Digital IO pin low level input voltage | Vil | | | 0.4 | V | |
| Digital IO pin high level input voltage | Vih | 0.8 * VCC | | | V | |
| Digital IO pin low level output voltage | Vol | | | 0.4 | V | Iol = 2 mA |
| Digital IO pin high level output voltage | Voh | VCC – 0.4 | | | V | Ioh = 2 mA |

[6] +13 dBm for outband; 0 dBm for inband

| Parameter | Symbol | Min | Typical | Max | Units | Condition |
|---|---|---|---|---|---|---|
| VCC_RF voltage | VCC_RF | | VCC - 0.1 | | V | |
| VCC_RF output current | ICC_RF | | | 50 | mA | |
| Receiver chain noise figure[7] | NFtot | | 3.5 | | dB | |
| Operating temperature | Topr | -40 | +25 | 85 | °C | |

**Table 11: Operating conditions**

☞ Operation beyond the specified operating conditions can affect device reliability.

## 4.3 Indicative power requirements

Table 12 lists examples of the total system supply current including RF and baseband section for a possible application.

☞ Values in Table 12 are provided for customer information only, as an example of typical current requirements. Values are characterized on samples with using a command cold start. Actual power requirements can vary depending on FW version used, external circuitry, number of SVs tracked, signal strength, type and time of start, duration, and conditions of test.

| Symbol | Parameter | Conditions | GPS+GLO+GAL+BDS | GPS+GLO | GPS | Unit |
|---|---|---|---|---|---|---|
| $I_{PEAK}$ | Peak current | Acquisition | 100 | 100 | 100 | mA |
| $I_{VCC}$[8] | VCC current | Acquisition | 50 | 42 | 37 | mA |
| | | Tracking (Continuous mode) | 36 | 31 | 27 | mA |
| | | Tracking (Power save mode) | 20 | 20 | 19 | mA |

**Table 12: Currents to calculate the indicative power requirements**

All values in Table 12 are measured at 25 °C ambient temperature. SBAS is activated in all measurements.

7 Only valid for the GPS

8 Simulated signal, current measured at 3.0 V

# 5 Communications interfaces

There are several communications interfaces including UART, SPI, I2C[9] and USB.

All the inputs have internal pull-up resistors in normal operation and can be left open if not used. All the PIOs are supplied by VCC, therefore all the voltage levels of the PIO pins are related to VCC supply voltage.

## 5.1 UART interface

There is one UART interface: UART1, which operates up to and including a speed of 921600 baud. No hardware flow control is supported.

UART1 is enabled by default if D_SEL = 1 or unconnected.

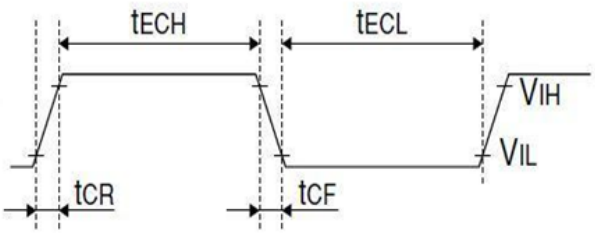



**Figure 3: NEO-M9N module UART timing specifications**

| Symbol | Parameter | Min | Max | Unit |
|---|---|---|---|---|
| $t_{ECH}$ | High period of external data input | 0 | 0.4 | µs |
| $t_{ECL}$ | Low period of external data input | TBA | TBA | µs |
| $R_u$ | Baudrate | 4800 | 921600 | bd |
| $t_{CR}$ | Rise time of data | | 5 | ns |
| $t_{CF}$ | Fall time of data | | 5 | ns |

**Table 13: NEO-M9N UART timings and specifications**

## 5.2 SPI interface

The NEO-M9N has an SPI slave interface that can be selected by setting D_SEL = 0. The SPI pins available are: SPI_MISO (TXD), SPI_MOSI (RXD), SPI_CS_N, SPI_CLK. The SPI interface is designed to allow communication to a host CPU. The interface can be operated in slave mode only. Note that SPI is not available in the default configuration because its pins are shared with the UART and I2C interfaces. The maximum transfer rate using SPI is 125 kB/s and the maximum SPI clock frequency is 5.5 MHz.

This section provides SPI timing values for the NEO-M9N slave operation. The following tables present timing values under different capacitive loading conditions. Default SPI configuration is CPOL = 0 and CPHA = 0.

[9] I2C is a registered trademark of Philips/NXP

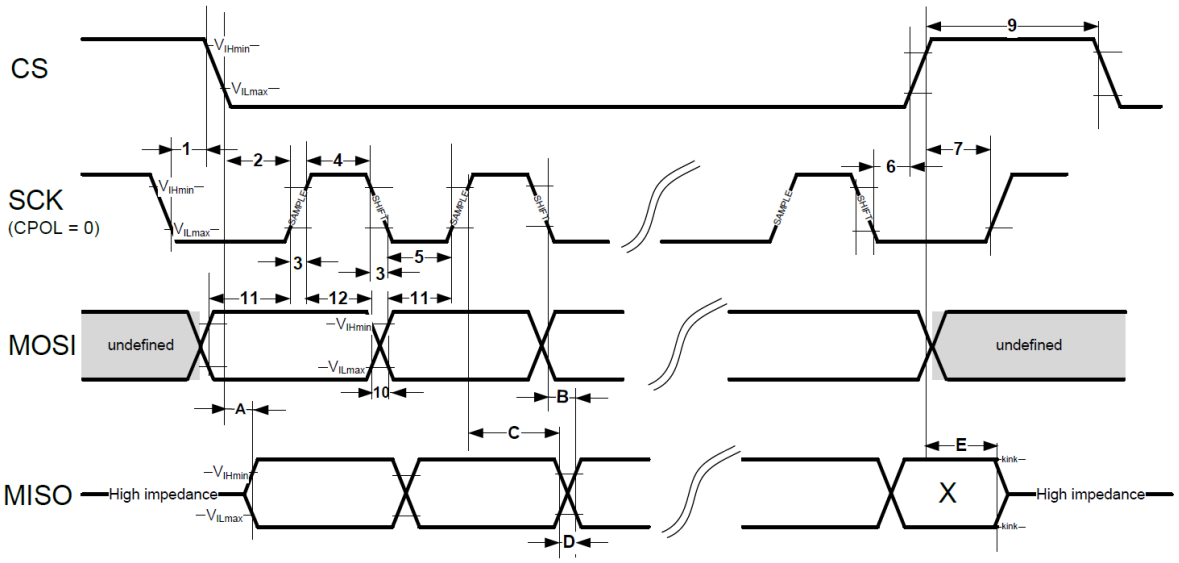



**Figure 4: NEO-M9N module SPI specification mode 1: CPHA=0 SCK = 5.33 MHz**

Timings 1 - 12 are not specified here as those are depending on SPI master. Timings A - E are specified for SPI slave.

| Timing value at 2 pF load | Min (ns) | Max (ns) |
|---|---|---|
| "A" - MISO data valid time (CS) | 14 | 38 |
| "B" - MISO data valid time (SCK) weak driver mode | 21 | 38 |
| "C" - MISO data hold time | 114 | 130 |
| "D" - MISO rise/fall time, weak driver mode | 1 | 4 |
| "E" - MISO data disable lag time | 20 | 32 |

**Table 14: NEO-M9N SPI timings at 2pF load**

| Timing value at 20 pF load | Min (ns) | Max (ns) |
|---|---|---|
| "A" - MISO data valid time (CS) | 19 | 52 |
| "B" - MISO data valid time (SCK) weak driver mode | 25 | 51 |
| "C" - MISO data hold time | 117 | 137 |
| "D" - MISO rise/fall time, weak driver mode | 6 | 16 |
| "E" - MISO data disable lag time | 20 | 32 |

**Table 15: NEO-M9N SPI timings at 20pF load**

| Timing value at 60 pF load | Min (ns) | Max (ns) |
|---|---|---|
| "A" - MISO data valid time (CS) | 29 | 79 |
| "B" - MISO data valid time (SCK) weak driver mode | 35 | 78 |
| "C" - MISO data hold time | 122 | 152 |
| "D" - MISO rise/fall time, weak driver mode | 15 | 41 |
| "E" - MISO data disable lag time | 20 | 32 |

**Table 16: NEO-M9N SPI timings at 60pF load**

## 5.3 Slave I2C interface

An I2C compliant interface is available for communication with an external host CPU. The interface can be operated in slave mode only. It is fully compatible with Fast-Mode of the I2C industry

standard. Since the maximum SCL clock frequency is 400 kHz, the maximum bit rate is 400 kbit/s. The interface stretches the clock when slowed down while serving interrupts, therefore the real bit rates may be slightly lower.

☞ The I2C interface is only available with the UART default mode. If the SPI interface is selected by using D_SEL = 0, the I2C interface is not available.

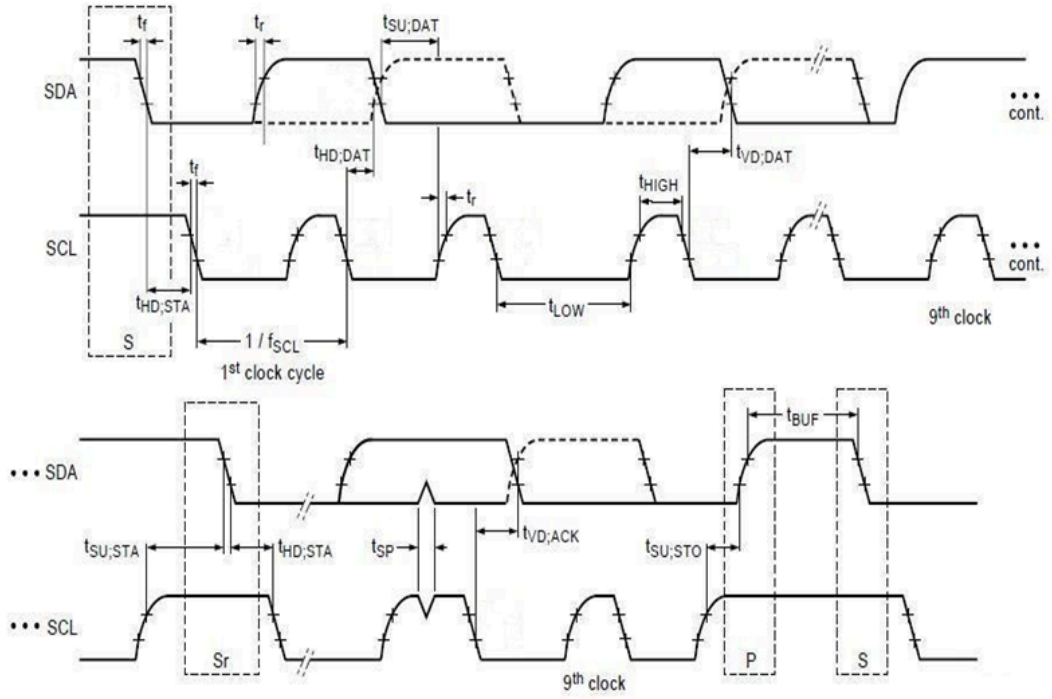



**Figure 5: NEO-M9N module I2C slave specification**

| Symbol | Parameter | Min (Standard / Fast-mode) | Max | Unit |
|---|---|---|---|---|
| $f_{SCL}$ | SCL clock frequency | 0 | 400 | kHz |
| $t_{HD;STA}$ | Hold time (repeated) START condition | 4.0/1 | - | µs |
| $t_{LOW}$ | Low period of the SCL clock | 5/2 | - | µs |
| $t_{HIGH}$ | High period of the SCL clock | 4.0/1 | - | µs |
| $t_{SU;STA}$ | Set-up time for a repeated START condition | 5/1 | - | µs |
| $t_{HD;DAT}$ | Data hold time | 0/0 | - | µs |
| $t_{SU;DAT}$ | Data set-up time | 250/100 | | ns |
| $t_r$ | Rise time of both SDA and SCL signals | - | 1000/300 (for C = 400pF) | ns |
| $t_f$ | Fall time of both SDA and SCL signals | - | 300/300 (for C = 400pF) | ns |
| $t_{SU;STO}$ | Set-up time for STOP condition | 4.0/1 | - | µs |
| $t_{BUF}$ | Bus free time between a STOP and START condition | 5/2 | - | µs |
| $t_{VD;DAT}$ | Data valid time | - | 4/1 | µs |
| $t_{VD;ACK}$ | Data valid acknowledge time | - | 4/1 | µs |
| $V_{nL}$ | Noise margin at the low level | 0.1 VCC | - | V |
| $V_{nH}$ | Noise margin at the high level | 0.2 VCC | - | V |

**Table 17: NEO-M9N I2C slave timings and specifications**

## 5.4 USB interface

A USB interface, which is compatible to USB version 2.0 FS (Full Speed, 12 Mbit/s), can be used for communication to a host. The V_USB pin supplies the USB interface.

## 5.5 Default interface settings

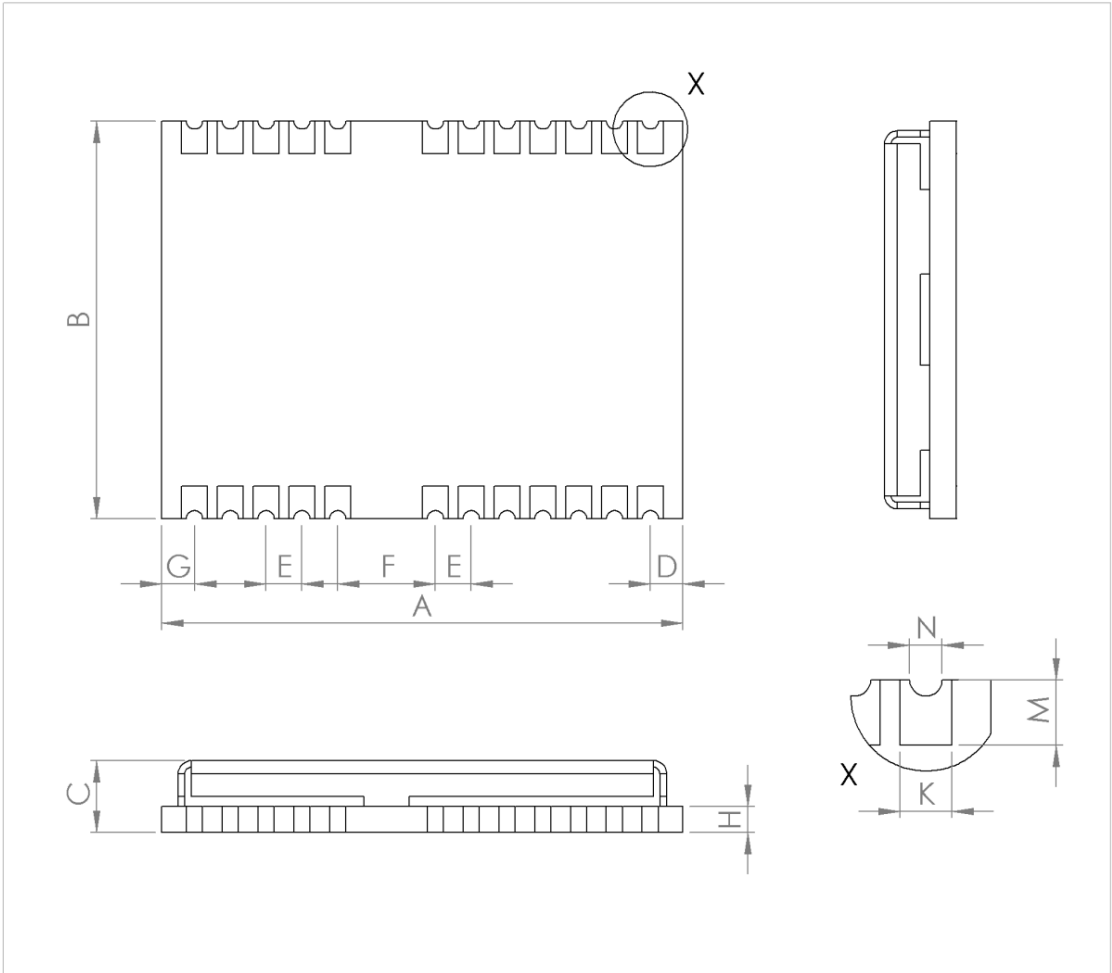
| Interface | Settings |
|---|---|
| UART | 38400 Baud, 8 bits, no parity bit, 1 stop bit.<br>Output messages: NMEA **GGA, GLL, GSA, GSV, RMC, VTG, TXT** (no UBX).<br>Input protocols: UBX, NMEA and RTCM 3.3. |
| USB | Output messages activated as in UART. Input protocols available as in UART. |
| I2C | Output messages activated as in UART. Input protocols available as in UART. |
| SPI | Output messages activated as in UART. Input protocols available as in UART. |

**Table 18: Default interface settings**

☞ Refer to the u-blox NEO-M9N Interface description [2] for information about further settings.

By default the NEO-M9N outputs NMEA 4.10 messages that include satellite data for all GNSS bands being received. This results in a higher-than-before NMEA load output for each navigation period. Make sure the UART baud rate being used is sufficient for the selected navigation rate and the number of GNSS signals being received.

# 6 Mechanical specification




| Symbol | Min. (mm) | Typ. (mm) | Max. (mm) |
|---|---|---|---|
| A | 15.9 | 16.0 | 16.6 |
| B | 12.1 | 12.2 | 12.3 |
| C | 2.2 | 2.4 | 2.6 |
| D | 0.9 | 1.0 | 1.3 |
| E | 1.0 | 1.1 | 1.2 |
| F | 2.9 | 3.0 | 3.1 |
| G | 0.9 | 1.0 | 1.3 |
| H | | 0.82 | |
| K | 0.7 | 0.8 | 0.9 |
| M | 0.8 | 0.9 | 1.0 |
| N | 0.4 | 0.5 | 0.6 |
| Weight | | 1.6g | |

**Figure 6: NEO-M9N mechanical drawing**

# 7 Reliability tests and approvals

All u-blox modules are based on AEC-Q100 qualified GNSS chips.

Tests for product family qualifications are according to ISO 16750 "Road vehicles – environmental conditions and testing for electrical and electronic equipment", and appropriate standards.

## 7.1 Approvals


The NEO-M9N is designed to in compliance with the essential requirements and other relevant provisions of Radio Equipment Directive (RED) 2014/53/EU.

The NEO-M9N complies with the Directive 2011/65/EU (EU RoHS 2) and its amendment Directive (EU) 2015/863 (EU RoHS 3).

Declaration of Conformity (DoC) is available on the u-blox website.

# 8 Labeling and ordering information

This section provides information about product labeling and ordering. For information about product handling and soldering see the NEO-M9N Integration manual [1].

## 8.1 Product labeling

The labeling of the NEO-M9N modules provides product information and revision information. For more information contact u-blox sales.

## 8.2 Explanation of product codes

Three different product code formats are used. The **Product name** is used in documentation such as this data sheet and identifies all u-blox products, independent of packaging and quality grade. The **Ordering code** includes options and quality, while the **Type number** includes the hardware and firmware versions. Table 19 below details these three different formats.

| Format | Structure | Code for this product |
|---|---|---|
| Product name | PPP-TGV | NEO-M9N |
| Ordering code | PPP-TGV-NNQ | NEO-M9N-00B |
| Type number | PPP-TGV-NNQ-XX | NEO-M9N-00B-00 |

**Table 19: Product code formats**

The parts of the product code are explained in Table 20.

| Code | Meaning | Example |
|---|---|---|
| PPP | Product family | NEO |
| TG | Platform | M9 = u-blox M9 |
| V | Variant | N = Standard precision with SAW and LNA |
| NNQ | Option / Quality grade | NN: Option [00...99]<br>Q: Grade, A = Automotive, B = Professional |
| XX | Product detail | Describes hardware and firmware versions |

**Table 20: Part identification code**

## 8.3 Ordering codes

| Ordering code | Product | Remark |
|---|---|---|
| NEO-M9N-00B | u-blox NEO-M9N module, professional grade | |

**Table 21: Product ordering codes**

☞ Product changes affecting form, fit or function are documented by u-blox. For a list of Product Change Notifications (PCNs) see our website at: https://www.u-blox.com/en/product-resources.

# Related documents

**[1]** NEO-M9N Integration manual, doc. no. UBX-19014286
**[2]** NEO-M9N Interface description, doc. no. UBX-19035940

☞ For regular updates to u-blox documentation and to receive product change notifications please register on our homepage (http://www.u-blox.com).

# Revision history

| Revision | Date | Name | Status / comments |
|---|---|---|---|
| R01 | 15-Aug-2019 | jesk | Objective specification |
| R02 | 14-Nov-2019 | jesk | Advance information |
| R03 | 24-Jan-2020 | jesk | Advance information.<br>Added outband value for Prfin, renamed VDD_USB to V_USB. |

# Contact

For complete contact information visit us at www.u-blox.com.

**u-blox Offices**

**North, Central and South America**

**u-blox America, Inc.**
Phone: +1 703 483 3180
E-mail: info_us@u-blox.com

**Regional Office West Coast**
Phone: +1 408 573 3640
E-mail: info_us@u-blox.com

**Technical Support**
Phone: +1 703 483 3185
E-mail: support_us@u-blox.com

**Headquarters**

**Europe, Middle East, Africa**

**u-blox AG**
Phone: +41 44 722 74 44
E-mail: info@u-blox.com
Support: support@u-blox.com

**Asia, Australia, Pacific**

**u-blox Singapore Pte. Ltd.**
Phone: +65 6734 3811
E-mail: info_ap@u-blox.com
Support: support_ap@u-blox.com

**Regional Office Australia**
Phone: +61 2 8448 2016
E-mail: info_anz@u-blox.com
Support: support_ap@u-blox.com

**Regional Office China (Beijing)**
Phone: +86 10 68 133 545
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

**Regional Office China (Chongqing)**
Phone: +86 23 6815 1588
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

**Regional Office China (Shanghai)**
Phone: +86 21 6090 4832
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

**Regional Office China (Shenzhen)**
Phone: +86 755 8627 1083
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

**Regional Office India**
Phone: +91 80 4050 9200
E-mail: info_in@u-blox.com
Support: support_in@u-blox.com

**Regional Office Japan (Osaka)**
Phone: +81 6 6941 3660
E-mail: info_jp@u-blox.com
Support: support_jp@u-blox.com

**Regional Office Japan (Tokyo)**
Phone: +81 3 5775 3850
E-mail: info_jp@u-blox.com
Support: support_jp@u-blox.com

**Regional Office Korea**
Phone: +82 2 542 0861
E-mail: info_kr@u-blox.com
Support: support_kr@u-blox.com

**Regional Office Taiwan**
Phone: +886 2 2657 1090
E-mail: info_tw@u-blox.com
Support: support_tw@u-blox.com