Timing & Navigation Module

z052 USB GNSS Dongle with PPS*

PPS usable by timing applications
via serial port emulation

* The **Pulse Per Second** (PPS) is an electrical signal that very precisely indicates the start of a second. The z052 GNSS chipset delivers the PPS signal with accuracy ±20 nanoseconds.

The z052 USB dongle provides a GNSS receiver from an USB port and a **PPS timing output**. The z052 unit is based on a GNSS u-blox NEO-M8T timing receiver with 72-channel whose 32-channel continuous tracking and high sensitivity (tracking -167dBm GPS & Glonass).

This dongle receives and tracks multiple GNSS systems: GPS, Galileo, Glonass and BeiDou. Owing to the dual-frequency RF front-end architecture, either Glonass or BeiDou can be processed concurrently with GPS and Galileo signals providing reception of three GNSS systems according to the permissible combinations shown below (* = enabled):

GPS	Galileo	Glonass	BeiDou
*	*	-	-
*	*	*	-
*	*	-	*
*	-	*	-
*	-	-	*
-	*	*	-
-	*	-	*
-	-	*	*

⇨ The augmentation systems SBAS and QZSS can be enabled only if GPS operation is configured.

⇨ **The z052 product is configured by default with GPS, Glonass and Galileo.**

With its higher sensitivity, performance and faster startup times, the z052 module is a complete GNSS receiver that generates position fixes with high accuracy in extremely challenging environments and under poor signal conditions (down to -167 dBm), velocity and time data with leading edge acquisition times. In addition, the GNSS receiver provides a configurable 1 PPS synchronized to GPS/UTC, typically within 20 nanoseconds (one sigma) at chipset level and an update rate up to 4 Hz.

The z052 dongle optionally supports Satellite-Based Augmentation System (SBAS), including the U.S. Wide Area Augmentation System (WAAS), the European Geostationary Overlay Service (EGNOS), MSAS in Japan and GAGAN in India. Assisted GNSS (A-GNSS) is also supported.

When the USB dongle is connected to your equipment (desktop, laptop, netbook, UMPC …), a virtual serial port is available after installation of the driver by the operating system - for example: USB Serial Port (Com x).

For most of the operating systems two types of driver are available: Virtual COM Port (VCP) drivers and direct (D2XX) drivers.

- The VCP driver emulates a standard PC serial port such that the USB device may be communicated with as a standard RS232 device. Virtual COM port (VCP) drivers cause the USB device to appear as an additional COM port available to the PC. Application software can access the USB device in the same way as it would access a standard COM port.

- The D2XX driver allows direct access to the USB device via a DLL interface. Application software can access the USB device through a series of DLL function calls.

VCP drivers currently supported:

- Windows 7, Windows Server 2008 R2 and Windows 8, 8.1, Windows server 2012 R2, Windows Server 2016 and Windows 10.
- Linux (VCP driver is integrated in the kernel)
- Mac OS X 10.3 to 10.8
- Mac OS X 10.9 and above
- Windows CE 4.2-5.2: includes the following versions of Windows CE 4.2-5.2 based operating systems: Windows Mobile 2003, Windows Mobile 2003 SE, Windows Mobile 5, Windows Mobile 6, Windows Mobile 6.1, Windows Mobile 6.5
- Windows CE 6.0/7.0
- Windows CE 2013

D2XX direct drivers currently supported:

- Windows 7, Windows Server 2008 R2 and Windows 8, 8.1, Windows server 2012 R2, Windows Server 2016 and Windows 10.
- Windows RT (x86-32 & ARM)
- Linux
- Mac OS X 10.4 Tiger or later
- Windows CE 4.2-5.2: includes the following versions of Windows CE 4.2-5.2 based operating systems: Windows Mobile 2003, Windows Mobile 2003 SE, Windows Mobile 5, Windows Mobile 6, Windows Mobile 6.1, Windows Mobile 6.5
- Windows CE 6.0/7.0
- Windows CE 2013
- Android (Java D2XX)

The USB dongle contains a USB to serial UART interface and the PPS signal provided by the GNSS chipset is connected internally to pin 8 (CTS). So, the PPS signal delivered by the USB dongle is available by using the CTS signal on the virtual com port used.

Applications	Benefits
Timing and Synchronization	Ultra-compact GNSS receiver with high accuracy by using the PPS signal for timing applications
Vehicle Navigation Automatic Vehicle Location	Accurate GNSS positioning within 2.5 meters

Key Features

• u-blox NEO-M8T concurrent GNSS **timing chipset** with internal Flash memory that allows future firmware updates

• Concurrent reception of GPS/QZSS, GLONASS, BeiDou and Galileo

• Market leading acquisition and tracking sensitivity

• Optimized accuracy and availability with survey-in and single-satellite timing

• Maximized reliability with integrity monitoring and alarms

• Assisted GNSS (AssistNow Online and Offline from u-blox, AssistNow Autonomous)

• Satellite-Based Augmentation System (SBAS): WAAS (US), EGNOS (Europe), MSAS (Japan) and GAGAN (India) and QZSS for the Pacific region covering Japan and Australia

• Max navigation update rate: 4 Hz (GPS & Glonass, GPS & Beidou), 10 Hz (GPS, Glonass, BeiDou, Galileo)

• Protocols: NMEA, UBX binary, RTCM

• **PPS timing output**

• Use of an external active GNSS antenna

• Compact Design with a size of a USB key (USB 2.0 Interface)

• Suitable for Laptop, Desktop, Mobile Device, UMPC, Eee PC, Notebooks and Netbooks

• RoHS Compliance

z052 with external GNSS Antenna

Note: ZTI Communications is not responsible for the operation or failure of operation of GNSS satellites or the availability of GNSS satellite signals.

GNSS Performance Specifications

GNSS performance statistics are clear view, stationary. Sensitivity based on signals measured at the antenna.

Parameter	Value
Receiver type	72-channel u-blox M8T timing engine GPS L1 C/A, QZSS L1C/A, QZSS L1SAIF, GLONASS L1OF, BeiDou B1, Galileo E1-B/C SBAS: WAAS (US), EGNOS (Europe), MSAS (Japan), GAGAN (India)
Navigation Update Rate	Concurrent GNSS: up to 4 Hz, 1 Hz (default) GPS, Glonass, BeiDou, Galileo: up to 10 Hz
Position Accuracy	2.5 m CEP (Autonomous) 2.0 m (SBAS)
Acquisition time Cold starts: Aided cold starts:	GPS & Glonass GPS & BeiDou 25 s 28 s 2 s 2 s
Sensitivity Tracking & Navigation: Cold start (aided): Cold start (autonomous): Reacquisition:	GPS & Glonass GPS & BeiDou -167 dBm -166 dBm -157 dBm -157 dBm -148 dBm -148 dBm -160 dBm -160 dBm
Anti jamming	Active CW detection and removal; on-board SAW band pass filter
Memory	Internal SQI flash for firmware update
Timing Accuracy	≤ 20 ns Clear Sky ≤ 500 ns Indoor
Time Pulse Frequency	0.25 Hz – 10 MHz, 1 Hz (default)
Time-pulse jitter	±11 ns
Integrity reports	RAIM active, phase uncertainty Time-pulse rate/duty-cycle
Protocols	NMEA, UBX binary, RTCM
Operational limits	Dynamics ≤4g Altitude 50,000 m Velocity 500 m/s

GNSS Communication Parameters

GNSS output is available from a USB Interface. The output adheres to NMEA 0183 protocol V4.1 with the following characteristics.

Parameter	Value(s)
Protocol	NMEA 0183, version 2.3 or 4.0 or 4.1 configurable ***V4.1 selected for the z052 dongle***
Baud Rate	
Default	57600
Other	4800, 9600, 19200, 38400, 115200, 230400, 460800

Message Output Rate	1 Hz (Up to 4 Hz)
Number of message types restricted by Baud Rate	

NMEA 0183 Messages

Message	Description
DTM	Datum Reference
GBQ	Poll a standard message (if BeiDou)
GBS	Satellite Fault Detection
GGA	Global positioning system fix data
GLL	Latitude and longitude, with time of position fix and status
GLQ	Poll a standard message (if Glonass)
GNQ	Poll a standard message (if any combination of GNSS)
GNS	GNSS fix data
GPQ	Poll a standard message (if GPS, SBAS, QZSS)
GRS	GNSS Range Residuals
GSA	GNSS DOP and Active Satellites
GST	GNSS Pseudo Range Error Statistics
GSV	GNSS satellites in view
RMC	Recommended minimum data
TXT	Text Transmission
VLW	Dual ground/water distance
VTG	Course over ground and Ground speed
ZDA	Time and date

⇨ *NMEA messages V4.1 configured for the z052 dongle: GGA, GSV, GSA, VTG, RMC and ZDA*

Mechanical and Environmental

Dimensions (including USB connector)	78.3mm L x 22.3mm W x 14.1mm H
High Speed USB 2.0 (480 Mbit/s)	USB A-type Male Plug for connection to a USB host or Hub port. The maximum cable length is 5 meters according to the USB 2.0 specification.
External Aerial Connector	MCX
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
Humidity	5% to 95% non-condensing @ 60°C
Weight	20g
Warranty	1-Year
Environmental	RoHS compliant (lead-free)
Power	Voltage DC 5V via USB port, Current < 55mA (tracking)

Ordering Information

Reference	Description
z052-USB	z052 USB GNSS Dongle with PPS * / Timing & Navigation Contains: z052 USB GNSS Dongle with PPS + GNSS patch antenna + USB Extension Cable + CD-ROM (Software & Documentation).
z052-STK	z052-STK (Starter Kit) = z052-USB + TSS-P for z052 software Contains: z052 USB GNSS Dongle with PPS + GNSS patch antenna + USB Extension Cable + CD-ROM (Software & Documentation) with Windows **TSS-P for z05x** software – single license. (TSS-P for z05x = **T**ime **S**ervice Software updates the PC clock with **1ms guaranteed accuracy**).

* *Product designed and manufactured in France.*