



T109 v2

**NTS / NTP Server with OSNMA
GPS/GLONASS/BEIDOU/GALILEO/QZSS**



**Network Time Security server / Multi-GNSS Primary Clock,
with OSNMA authenticated synchronization,
and Gb Ethernet / SFP ports**

HEOL-T109: HIGH PERFORMANCE SYNCHRONIZATION UNIT

The T109 V2 Time server / Multi-GNSS Clock has been designed to provide very accurate timing information through Ethernet electrical or optical link (using **Network Time Security protocol** and/or NTP protocol), for Network synchronization and measurement applications, without the need to be connected to external Network, hence preserving your Network insulation. The quad-core ARM Cortex A53, 2GHz processors, allow very high NTP/NTS request rates, up-to 10 000 requests per second. An additional FPGA manages internal Time-management of GNSS source.

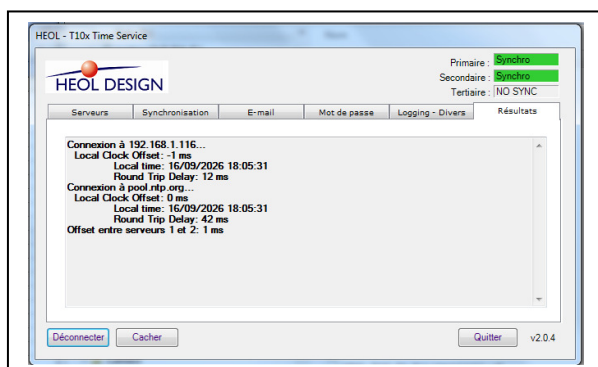
It provides up to 5 RJ45 and 2 SFP Gigabit ports, for fully isolated networks; with several secured administration protocols.

Based on a high performance GPS/GLONASS/GALILEO /BEIDOU/QZSS timing chipset (with **-160dBm** sensitivity), it delivers extremely accurate timing information, even in poor signal level conditions (**indoor**, urban canyons and signal obscured environments). The antenna (protected against short-circuit) does not need to be located up a mast or on the rooftop as is the norm, which considerably **reduces the cost and complexity** of deployment in terms of antenna cabling and lightning strike protection and reduces the cost of maintenance. Authenticated Galileo signals are also guaranteed thanks to **OSNMA** service (in option).



Thanks to its self-survey mode, the accuracy of the timestamp (compliant with SNTP protocol) is better than **±1 microsecond**, reference is UTC atomic clock. This accuracy is achievable even with only 1 satellite being tracked.

If the satellites signals are completely lost, the **hold-over mode** enables the module to keep sending accurate Ethernet frames, with a drift better than 500µs/day (with **OCXO** option), or 2µs/day with **RUBIDIUM** oscillator.



The **Time Service software** can be installed on any host computer, to synchronize computers using NTP/SNTP protocol.

Accuracy and specific alarms are displayed at every connection.

A secured **HTTPS web server** with secure access allows you to configure the HEOL-T109, and monitor its status at a glance (GNSS satellites strength signals, Ethernet connections, alarms, input/outputs...). Users can also monitor and access the T109 settings through ssh.

A 2500V isolated event input allows you to **time-stamp events from external systems**, with ± 100 nanoseconds accuracy, refer to UTC atomic clock. The TimeStamp information is reported through RS232, SNMP trap, E-mail or Broadcast frame. A second event input is available in option.

In option, a battery powered internal RTC can provide timing information if no GNSS satellites are available at power-up (antenna disconnected or hidden inside a building).

Alarm relay is available, for driving your external systems in case of failure of the T109.

A highly accurate **pps (TOP signal)** signal is available on SUB-D9 connector (pin 8 for Linux applications) or I/O or BNC connector (polarity, period, length, and delay compensation are configurable by user). It is also available with optional 1500V isolated static relay (in this case Alarm relay is not available).

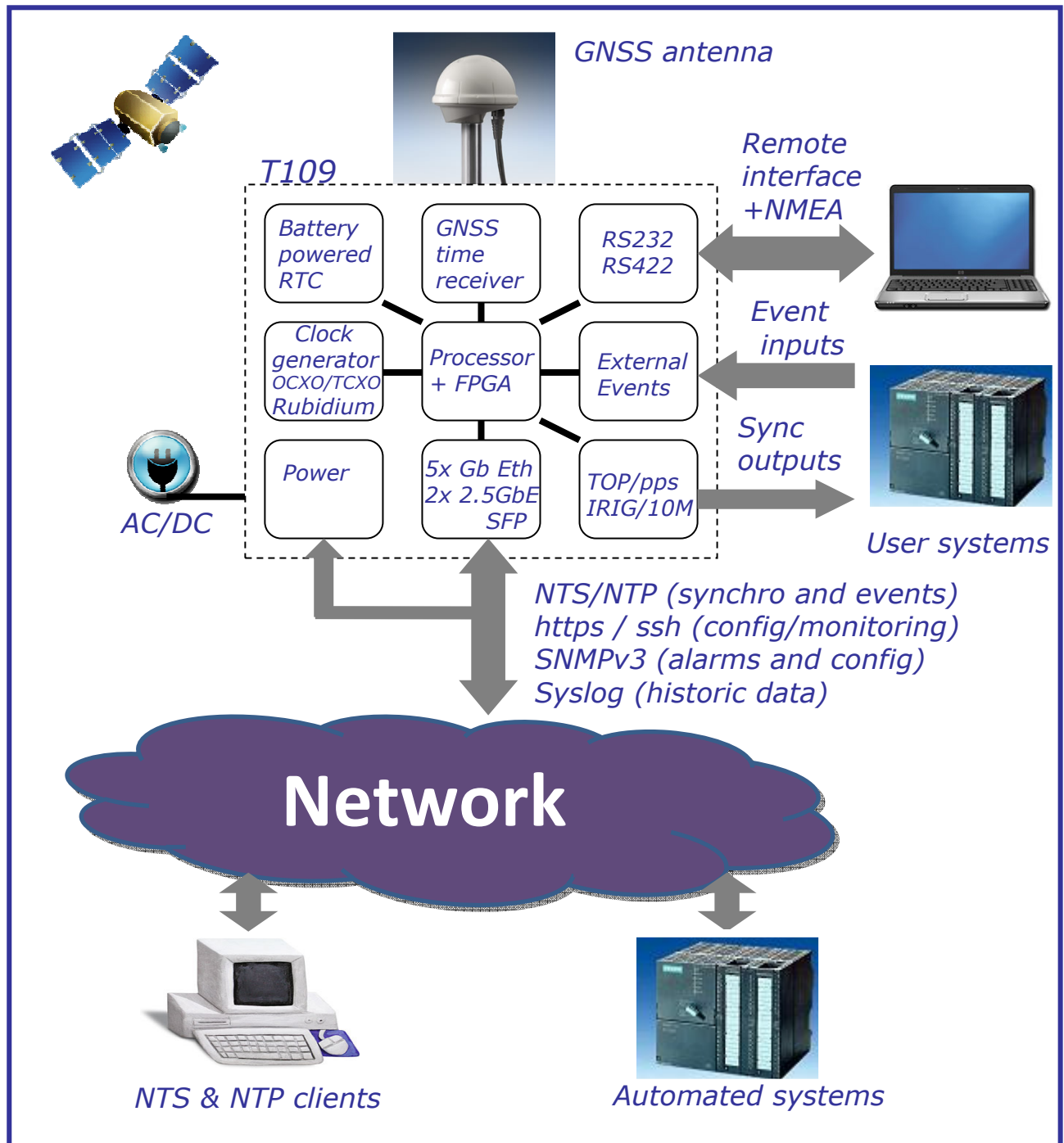
In option, **IRIG-B003** output is available on the I/O connector. IRIG-B123 is also available on request.

10MHz sinewave output is also available on request, with a frequency accuracy better than $1.10e-12$ when locked to GNSS (with Rubidium oscillator).

Alarms are displayed through **SNMP v3** traps or through RS232. SNMP can also be used to configure T109 parameters (instead of http web server), as well as SSH and Syslog.

A RS232 or RS422 serial port can be accessed for remote control and monitoring (protocol output NMEA).

The T109 is available in 19" rack mounted form factor, with an **OLED** module that displays the status and timing information.



T109 synoptic and external links

SPECIFICATIONS

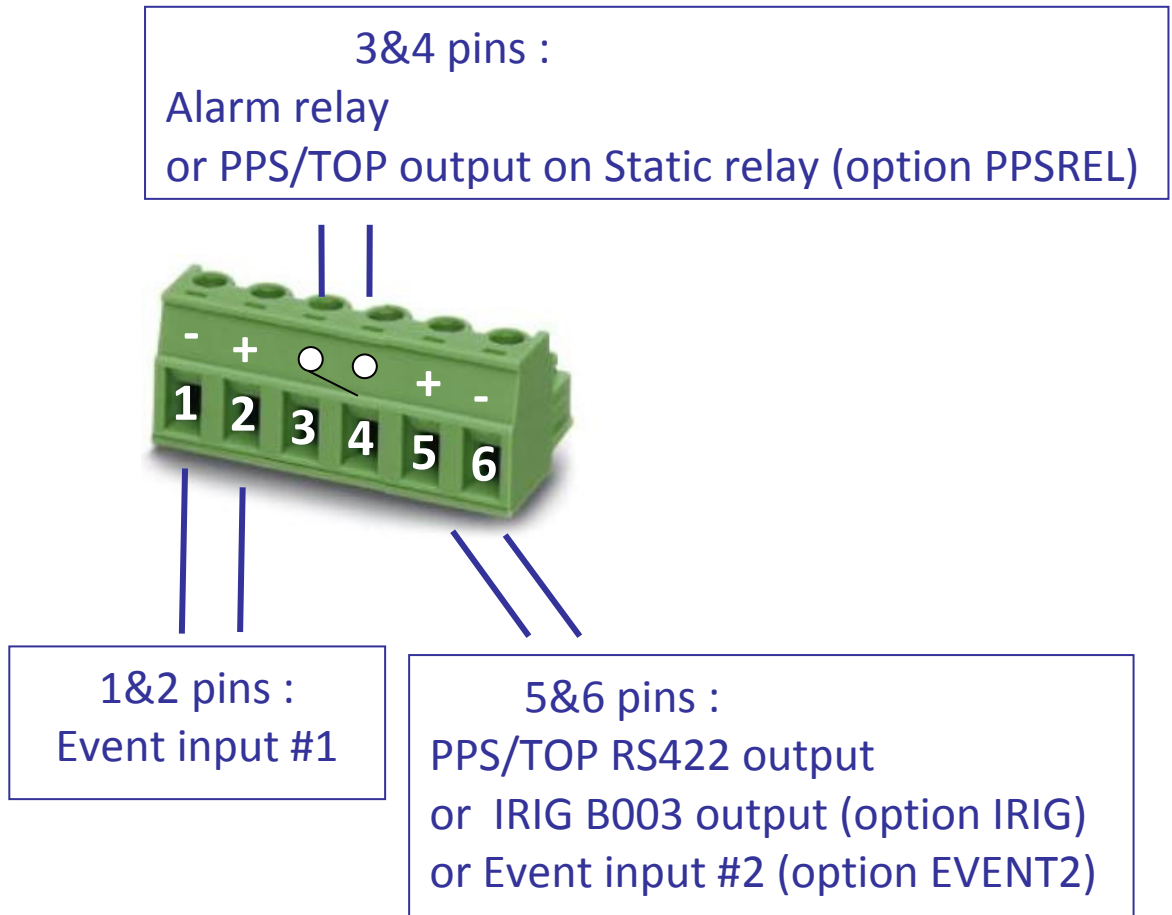
GNSS Receiver	Type	32 channels , selectable constellations : GPS/GLONASS/GALILEO/BEIDOU/QZSS+SBAS Full L1/L2/L5 bands for GNSS receiver with OSNMA option
	Sensitivity	-160dBm tracking, -148dBm acquisition
	Time Accuracy (pps)	± 15 ns rms (1σ)
	Warm up time - hot start - cold start	< 1 minute < 2 minutes
	Self survey mode (with OCXO or Rubidium)	24 hours
Timing Generator	Timing Ethernet protocol	NTS / NTP , up to 10 000 reqs per second
	Configuration / monitoring	HTTPS server, SNMP v3, SSH, Syslog
	Absolute timestamp error (refer to UTC time)	Internal TimeStamping better than 1μ s Downto 3μ s accuracy on Linux NTP/NTS client
	Timestamp drift when synchronization lost (at constant temperature)	Standard TCXO option: 200μ s/hour OCXO option : less than 500μ s/day HQ-OCXO option : less than 10μ s/day Rubidium option : less than 2μ s/day
	Battery powered RTC option	1 millisecond accuracy Autonomy : 12 months Max drift 1 s / day on full temp range
Power supply	Input Voltage	85/250VAC, 110/250VDC (Rack), 47/63Hz
	Power consumption	T109: 10W T109 with OCXO: 12W T109 with Rubidium: 15W
Interfaces		
	5V GNSS Active antenna	SMA, TNC or 'N'
	Ethernet links	Up to 5 x RJ45, 1Gbps Up to 2 x 2.5GbE, SFP
	Remote RS232 / RS422	SUB-D9, 38400/8/No/1
	pps output	On SUB-D9 On I/O connector : RS422 level, or on fast static relay. ON BNC connector in option
	Alarm Relay	On I/O connector 2A/250V. 2500V isolation
	Event input	On I/O connector (up to 16 inputs). 25V max peak voltage, add resistor for higher 2500V isolation, ± 100 ns accuracy
	10MHz output option	On BNC connector frequency accuracy < $1.10e-12$ after 1 day GPS lock (with Rubidium option)
	IRIG-B003 output option	On I/O connector Differential RS422 level

Environmental	Operating Temperature	From 0/50°C to -40/+85°C, depending Upon the option
	Storage Temperature	-40 / +85°C
	Humidity	90% non-condensing
	Dimensions	1U height 482.6mm / 19" (front plate width) 420mm (enclosure width) 180 mm depth
	Weight	2.8 Kg

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

- According to  directive, the T109 module has passed the following tests :
 - EN55022/55011 class B : conducted and radiated emissions.
 - EN61000-4-2: Immunity to electrostatic discharges.
 - EN61000-4-3: Immunity tests on electromagnetic fields radiated at radio-electrical frequencies, with 10V/m electromagnetic field.
 - EN61000-4-4: Immunity to rapid transients.
 - EN61000-4-5: Immunity to surge.
 - EN61000-4-6: Immunity tests on conducted interference, induced by radio-electrical fields.
 - EN61000-4-8: Immunity to Power frequency magnetic field (30 A/m)
 - EN61000-4-11: Voltage dips, short interruptions and voltage variations immunity tests.
- Compliance with the International Safety Standard for Information Technology (IEC/EN 60950).
- The HEOL-T109 module is RoHS (lead free) compliant.





I/O connector details

ORDERING PART NUMBER

T109-4E-1S-AC-I/O-RTC-OCXO

- Number of Gb Ethernet ports (1-5) ↑
- Number of 2.5GbE SFP ports (1-2) ↑
- Power AC : 110V-220V or AC + POE ↑
- I/O option I/O connector mounted (blank : not mounted) ↑
- RTC option : for fast start without GNSS satellites ↑
- Oscillator option ↑
 - OCXO: 25ppb stability over -40/+85°C
 - HQ-OCXO : 0 / +50°C
 - RUB : Rubidium : 0 / +50°C
 - (blank : standard TCXO)

If other options are needed, just add the part number of these options at the end of the T109 part number :

- OSNMA for authenticated Galileo synchronization
- 422 for RS422 serial port instead of RS232
- EVENT2 for secondary Event input
- IRIG for IRIG-B003 output
- PPSREL for PPS/TOP output on fast static relay
- N or TNC or BNC connector option
- 10M for 10MHz sinewave output on BNC connector