HEOL DESIGN

T108, GPS/GLONASS/BEIDOU Time Server

Galileo (Europe) and QZSS (Japan) ready

**NTP Time server / Multi-GNSS Primary Clock,
with PoE and advanced I/O synchronization features.
- Static applications -**

HEOL-T108: HIGH ACCURACY SYNCHRONIZATION UNIT

The T108 Time server / Multi-GNSS Clock has been designed to provide very accurate timing information trough an Ethernet link (using NTP/SNTP protocol), for Network synchronization and measurement applications, without the need to be connected to external Network, hence preserving your Network insulation. **It is dedicated to static applications.**

Based on a high performance 32 channels GPS/GLONASS/GALILEO/BEIDOU 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.

With Time-Receiver Autonomous Integrity Monitoring (T-RAIM) algorithm, accuracy is guaranteed in the weakest signal environments.

Thanks to its self-survey mode, the accuracy of the timestamp (compliant with SNTP protocol) is better than **±200 nanoseconds** for the receive packet and **±600 nanoseconds** for the transmit packet (with the 1µs version) - 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).

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 **web server** with secure access allows you to configure the HEOL-T108, and monitor its status at a

HEOL DESIGN

glance (GNSS satellites strength signals, Ethernet connections, alarms, input/outputs…).

Automatic **E-mails** can be sent by the HEOL-T108, periodically or when alarms appear. This function is fully configurable via the http server.

A 2500V isolated event input allows you to **time-stamp events from external systems**, with very high accuracy (±100 nanoseconds, 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, an 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 T108.

A highly accurate **pps** (**TOP** signal) signal (**±100ns**) is available on SUB-D9 connector (pin 8 for Linux applications) or I/O 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).

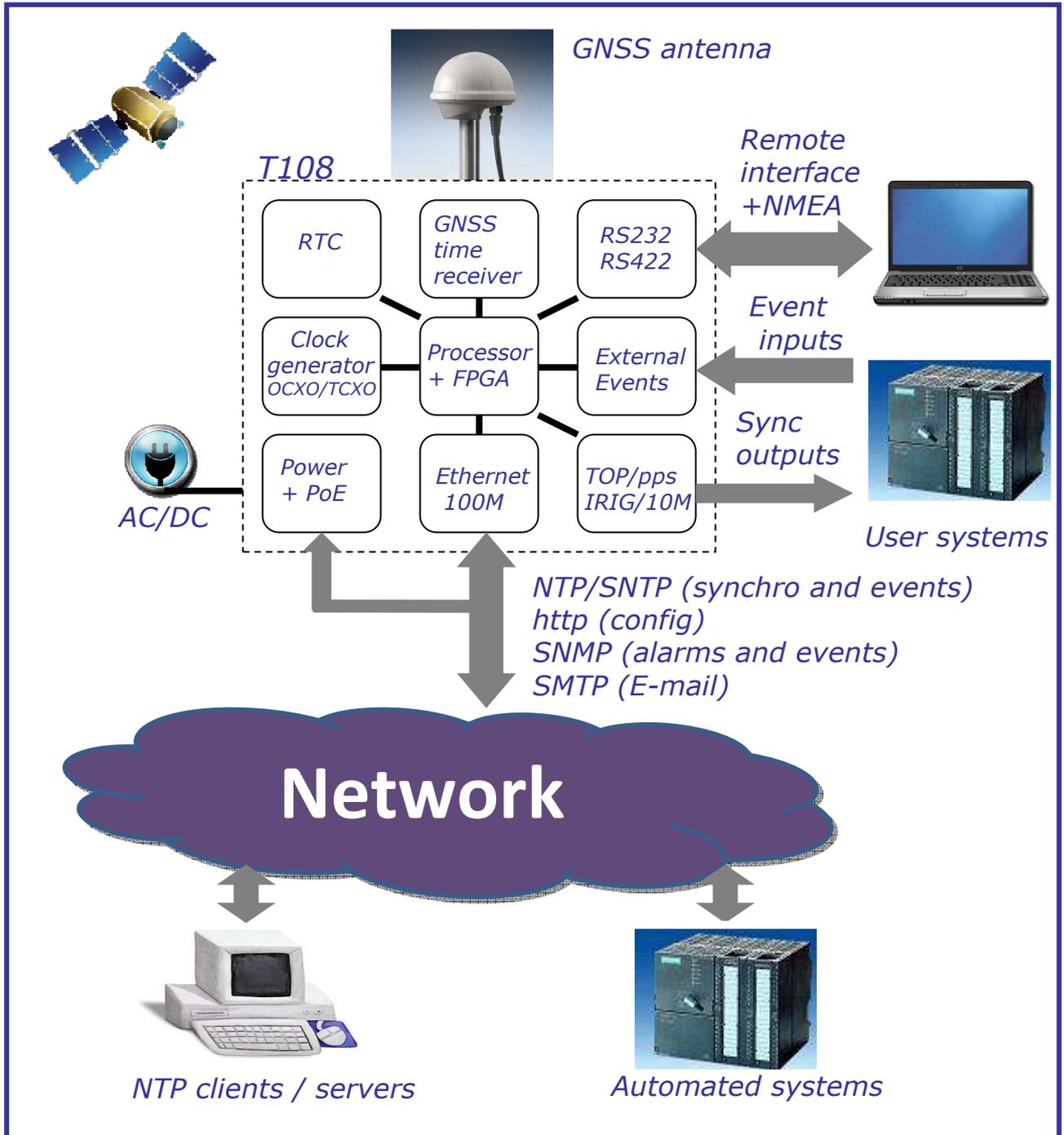In option, **IRIG**-B003 output is available on the I/O connector.

Alarms are displayed through **SNMP** traps (Ethernet interface) or through RS232. SNMP can also be used to configure T108 parameters (instead of http web server).

A RS232 or RS422 serial port can be accessed for remote control and monitoring (protocol output : TSIP or NMEA, selectable through web server).

Historic data can be backed-up to an EEPROM (up to 8000 status records).

The **Power On Ethernet** enables installation of the T108 without the need for additional cables to provide power.

The T108 is available in a compact (DIN rail adaptable) or 19'' rack mounted form factor, with a LCD module that displays the status and timing information.

GNSS antenna

T108

RTC	GNSS time receiver	RS232 RS422
Clock generator OCXO/TCXO	Processor + FPGA	External Events
Power + PoE	Ethernet 100M	TOP/pps IRIG/10M

AC/DC

Remote interface +NMEA

Event inputs

Sync outputs

User systems

NTP/SNTP (synchro and events)
http (config)
SNMP (alarms and events)
SMTP (E-mail)

Network

NTP clients / servers

Automated systems

T108 synoptic and external links

HEOL DESIGN

SPECIFICATIONS

GNSS Receiver	Type	32 channels GPS/GLONASS/GALILEO/BEIDOU/QZSS
	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	SNTP V4, NTP Broadcast/Unicast (100 requests per second maximum)
	Configuration / monitoring	http server or SNMP manager
	Absolute timestamp error (refer to UTC time)	±200ns for Rx (1µs version) ±600ns for Tx (1µs version)
	Timestamp drift when synchronization lost (at constant temperature)	Standard TCXO option: 200µs/hour OCXO option : less than 500µs/day Rubidium option : less than 1µs/day
	Battery powered RTC option	1 millisecond accuracy Autonomy : 6 months Max drift 1 s / day
Power supply	Input Voltage	Power Ethernet: IEEE 802.3af compliant Auxiliary: 14 to 60 VDC (-48V Telecom compliant) or 85/250VAC, 110/250VDC (Rack) 47/63Hz, (400 Hz on request)
	Power consumption	T108C: 5W T108R: 8W T108C with OCXO: 7W T108R with OCXO: 10W
Interfaces	Auxiliary DC Power Supply	2.54mm header, anti-extraction
	5V GNSS Active antenna	T108C : SMA or TNC T108R : SMA, TNC or 'N'
	Ethernet link	RJ45, 10/100Mbps + POWER
	Remote RS232 / RS422	SUB-D9, 38400/8/No/1
	pps output	On SUB-D9 (pin 8, for Linux applications) On I/O connector : RS422 level, or on fast static relay.
	Alarm Relay	On I/0 connector 2A/250V. 2500V isolation
	Event input	On I/0 connector 25V max peak voltage (add R series for more), 2500V isolation, ±100ns accuracy
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 (T108C)	201 x 95 x 26 (mm)
	Weight (T108C)	340 grams
	Dimensions (T108R)	1U -482.6mm (19"")

HEOL DESIGN

-depth with SMA connector	130 mm
-depth with N connector	150 mm
Weight (T108R)	1,85 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 CE directive, the T108 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-T108x module is RoHS (lead free) compliant.

T108 19'' 1U Rack rear view (with 'N' antenna connector)

3&4 pins :
Alarm relay
or PPS/TOP output on Static relay (option PPSREL)
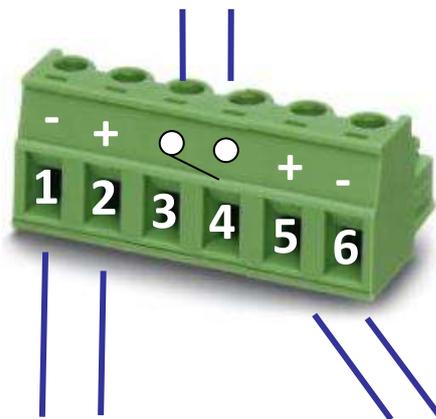
1&2 pins :
Event input #1

5&6 pins :
PPS/TOP RS422 output
or IRIG B003 output (option IRIG)
or Event input #2 (option EVENT2)

I/O connector details

HEOL DESIGN

ORDERING PART NUMBER

T108R-10µs-AC-I/O-OCXOSR-RTC

- Housing R: 19''Rack
  C: Compact

- NTP   1µs
  accuracy   10µs
             100µs
             1ms

- Power DC : 14 to 60V
  DC/POE: DC+Power Ethernet
  AC : 110 to 250V (Rack only)

- I/O option I/O connector mounted
              (blank : not mounted)

- OCXO option
  OCXOSR : standard (0 / +50°C)
  OCXOMR : medium (-20 / +65°C)
  OCXOHR : high (-40 / +70°C)
  RUB : Rubidium (Rack in AC version) - 0 / +50°C

- RTC option : for fast start without GNSS satellites

If other options are needed, just add the part number of these options at the end of the T108 part number :
-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 connector option (N only for rack)

HEOL DESIGN