NETWORKING

Ts2 / Ts2+

CLOCK MULTI-SYNC GATEWAY

TESTING | TROUBLESHOOTING | ACCURACY

Tempo's Ts2 is designed for deployment in distributed clustered architectures. In such deployments, timing resources are deployed close to the edge of the network in order to meet the phase and frequency precision requirements at the small cell or remote distributed or radio units (DU/RU). Ts2 is highly field-scalable and designed for such edge oriented distributed architectures.

The true innovation in this product lies in its simplicity, high performance, scalability and cost effectiveness. The Ts2 has some unique features designed to make it easily manageable and to provide resilient performance when reference sources are lost.

Ts2+

Ts2

Product Features:

- Multiple holdover options
- Full IEEE 1588-2008 (PTP) Grand Master
- Telecom BC functionality
- Supports G.8262 Synchronous Ethernet
- ITU-T G.8265.1 Frequency, ITU-T G.
- 8275.1 & G.8275.2 Time & Phase Profiles
- ITU-T G.8272 and G.8273.2 (T-BC)
- IEEE PC37.238 Power profile
- Supports 1-step & 2-step clock
- -48V DC power
- Remote provisioning & management
- CLI, HTTP(S) and SNMP
- 4 TDM Outputs Port Selectable T1/E1/2.048MHzSQ (with SSM)

Applications:

Precision sync platform designed for:

- 5G, ORAN, small cell clusters, C-RAN & neutral host deployments
- Smart grid transmission & distribution substations
- Mobile edge computing & enterprise
- Industrial IoT & factory automation applications
- Datacenters & financial applications

Benefits

- Small form-factor, designed for indoor deployments
- Highly scalable slave capacity
- Low power consumption
- High performance PTP clock
- Easy to deploy, user friendly management
- Position and location information to aid SAS and other location-based services
- Configurable to operate in multiple modes:
  - PTP Grand Master Clock
  - Boundary Clock
  - Slave Clock/Client Clock
  - PTP Probe
  - BITS Clock
  - PRC/PRS

TEMPO

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Technical Specifications:

INTERFACES

- 1x GNSS L1 Antenna (SMA); 50 Ω impedance, 5V
- 1x 1PPS out (BNC)
- 1x Synchronized programmable frequency out (BNC)
  - 1.544 MHz, 2.048 MHz, 10 MHz
- 1x Time of Day (ToD) + 1PPS in/out (RJ45/RS442)
  ToD Format - configurable (ASCII (YYYY-MM-DD HH:MM:SS), NMEA, or China Mobile Binary Format
- 2x IEEE 1588-2008 (PTP) 100Base-TX, 1000Base-T & 1000Base-T & 1000Base-X with Synchronous Ethernet (electrical RJ45 & optical SFP)
- 4 TDM Outputs Port Selectable T1/E1/2.048MHz SQ (with SSM)

IEEE 1588-2008 (PTP) Profiles

- PTP: l2: Ethernet; L3: UDP IPv4 / IPv6
- Default Profile
- ITU-T G.8265.1 frequency delivery profile
- ITU-T G.8275.1 & G.8275.2 time/phase delivery profile
- Power profiles: IEEE PC37.238 & IEEE 61850
- TSN (802.1AS)
- Enterprise profile
- SMPTE

GNSS

- GPS-only or GPS + Beidou / GLONASS
- Phase accuracy (within ± 100ns of UTC) as per G.8272

Holdover Performance

Phase holdover during GNSS outage achieved using a combination of PTP (in BC mode), syncE or local oscillator (details below):

Grade	Oscillator type	1.5 µs	5 µs	Frequency 16 ppb
Standard	OCXO	4 hrs	10 hrs	1 week
Superior	Super OCXO	8 hrs	15+hrs	1 month

Note: These are approximate values assuming constant temperature and assuming equipment is in normal operation mode for considerable time.

CAT. NO.	DESCRIPTION
TS2-32	PTP CLOCK MULTI-SYNC GATEWAY, 32 CLIENT
TS2-128	PTP CLOCK MULTI-SYNC GATEWAY, 128 CLIENT
TS2+32	T1/E1/PTP CLOCK MULTI-SYNC GATEWAY, 32 CLIENT
TS2+128	T1/E1/PTP CLOCK MULTI-SYNC GATEWAY, 128 CLIENT

Scability

- 32-256 [license/SKU option] slaves @ 128 packets per sec in unicast mode

Software Features

- DHCP
- SSH Server
- Serial terminal (console/craft)
- Remote firmware upgrade

Management

- 1x Management (10/100 Mbps, RJ45)
- CLI, HTTP(S), SNMP
- Remote login via SSH/Ethernet
- 1x mini USB console for local CLI access (craft interface)

Synchronous Ethernet (SyncE)

- Ethernet Synchronization Message Channel (ESMC)
- Support on both Ethernet interfaces (electrical and optical)

LEDs

- Power status

Power Supply

- Supply: 28 - 40 VAC or 36 - 60 VDC
- Power consumption: depends on holdover grade, typically 9W - 22W

Operating Specifications

- Operating temperature: 0° C to 50° C
- Storage temperature: -40° C to 70° C
- Size: 218 mm (W) x 159 mm (D) x 44 mm (H)
- RoHS compliant

Certifications

- FCC Part 15B (Class A) / CISPR 22 / EN 55022 (Class A)
- EN-61000-4-2 ESD
- EN-60960-1 Safety
- EN-300-386 Telecommunications Network Equipment (EMC)

Ts2+ ONLY:

Four independent TDM outputs to meet your legacy needs, port-selectable as:

- T1 with Sync Status Messages (SSM)
- E1 with Sync Status Messages (SSM)
- 2.048 MHz Square
- Mini-connector and output cable included

TEMPO COMMUNICATIONS

Renewed Vision. Innovation Forward.

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