

GPS Precision

- **Precision OCXO and Rubidium oscillators** for accuracy and stability
- **Un-interrupted operation**, even if GPS-signals are lost
- **Provides reference frequency**, timing and time code outputs
- **Ideal for rack mounting**, only 1U high
- **External 24V DC backup** for power supply redundancy
- **Easy to understand** user interface
- **Everything needed comes as standard:** 6x 10MHz, 1x 5MHz, 2x 1-pps, 2x Timecode outputs and 1x Event input



The 2804 is a Precision Time and Frequency reference using the GPS satellite signals to discipline a high-stability, low-noise oscillator. Applications include DAB and DVB-T transmitters, cellular communications, satellite ground stations, cal. labs and any application where accuracy and continuous availability are critical.

2804 Overview

Designed and manufactured under strict quality control conditions, the 2804 can be used with confidence as a frequency reference for both analog and digital TV and radio transmission, in cellular networks and for telecommunications timing. Other applications include military communication systems, satellite ground stations and calibration-laboratory systems, particularly in connection with the development and manufacture of high-technology products.

The 2804 comes with a choice of two different time base oscillators:

- Quartz referenced unit (standard)
- Rubidium referenced unit (option 14)

Quartz referenced units has become virtually an industry standard for numerous broadcast applications. In particular it has been successful for Digital Audio Broadcast (DAB) and Digital Video Broadcast (DVB) in Single Frequency Networks where the control of both frequency and timing is crucial.

A Rubidium-reference version offers exceptional accuracy for calibration-standard work or as a Master clock for satellite control centers or Telecommunications Timing. The 'stand-alone' accuracy of the reference oscillator is more than two orders-of-magnitude higher than a Quartz-referenced unit.

Flexible Configuration

Remote management of the 2804 is provided by dual bi-directional RS232 ports and an easy to operate command protocol. This permits all aspects of the 2804 performance to be controlled and monitored. As an option this facility can be provided via an Ethernet network port (option 1874A).

Support for Network Time Synchronization can be provided by selecting NMEA serial time output to an external NTP or SNTP Server PC.

The many standard features, makes the 2804 ideal as the heart of a timing and frequency generation system for every application.

When used with other Pendulum Instruments modules, for automatic change-over and distribution, two 2804 units can form the basis of a timing system that offer fully redundant operation and automatic reconfiguration in the event of a fault.

Everything Included

The 2804 offers an unmatched combination of accuracy, functionality and versatility. Instrument status is easily read and settings are easily made on the logical front panel keyboard and display. The standard unit contains everything needed for the time and frequency lab.

Standard outputs include 6x 10MHz, 1x 5MHz, 2x 1-pps, and 2x time code outputs. There is also an event input that will time stamp any input trigger event with a resolution of 1 microsecond.

A relay contact alarm output is standard and a combined 24Vdc and TTL-level alarm too. Dual communication ports (RS232) give full details of error conditions.

This impressive range of standard features, makes the 2804 a true **GPS Master Clock**.

2804 Technical Specifications

Standard Outputs and Input

6 x 10 MHz sine (BNC)

Output level: +10 dBm (0.7V_{rms}) in 50 Ω

1 x 5 MHz (BNC)

Output level: +10 dBm (0.7V_{rms}) in 50 Ω

2 x 1-pps (BNC)

Output level: Approx 0V to 2.0V in 50 Ω load

Accuracy - uncalibrated: ± 300 ns

Jitter: <50 ns rms

2 x Timecode outputs (BNC)

Codes available include IRIG-A,B, XR3,2137. Time code is user selectable in front panel menu.

1 x Alarm (BNC)

Signal coding: closed contact - normal
open contact - alarm

1 x 24V DC output + Alarm (prof DIN8)

Outputs: +24V, 0V, Alarm (TTL levels)

1 x Event time stamping input (BNC)

Input trigger level: TTL-level, positive or negative edge

Time stamp resolution: 1 μs

Memory depth: 8 readings

Event repetition rate up to 10 events/s

Phase noise

Oscillator:	Standard	Option 14
	10 MHz OCXO	10 MHz Rubidium
Offset from carrier:	dBc/Hz	dBc/Hz
1 Hz	-100	-80
10 Hz	-125	-100
100 Hz	-135	-130
1 kHz	-145	-145
10 kHz	-150	-150

Frequency uncertainty

Oscillator:	Standard	Option 14
	10 MHz OCXO	10 MHz Rubidium
GPS-locked mode		
Freq. offset (24h averaging)	<5·10 ⁻¹¹	<3·10 ⁻¹²
Freq. stability ADEV (1000 s averaging)	<1·10 ⁻¹⁰	<5·10 ⁻¹²
Hold-over mode		
Ageing per 24h (after 30 days operation) per month	<1·10 ⁻¹⁰	<3·10 ⁻¹¹
Short term stability ADEV 1 s averaging 10s averaging	<1·10 ⁻¹²	<3·10 ⁻¹²
Stability vs. Temperature 0 °C to 50 °C 25 °C ±10 °C typ.	<2·10 ⁻⁹ <±3·10 ⁻¹⁰	<1·10 ⁻¹⁰ <±5·10 ⁻¹¹
Initial freq. uncertainty (after loss of GPS-lock)	<1.5·10 ⁻¹⁰	
Max. freq. uncertainty (at end of 8h period)	<3·10 ⁻¹⁰	
Initial 1 pps timing output uncertainty (after loss of GPS-lock)	<1 μs	
Max. timing uncertainty (at end of 8h period)	<8 μs	

User Programmable Digital Synthesiser (Opt. 12)

Setting frequency 100 kHz-10 MHz

Setting resolution 0.01 Hz

Outputs 2 x 10 dBm sinewave 50 ohm (BNC)
1 x TTL-levels in 50 ohm (BNC)
1 x RS422 (BNO)

Front Panel Display

2 line, 40 character VFD display

Front Panel Indicators

AC power ON (amber)
DC power ON (amber)
System reset (red)
Display fault (red)
Built in Test fail (red)
GPS Status (green)
Control status (green)

GPS

GPS Receiver: 12 Ch Correlation, TTFF <4 min. typ.

GPS Antenna: L1, High-Environment, double-filtered type, with +5V LNA

Connections: N-type female

Power Supply

100, 115 or 230V nominal, Tolerance +/-10%, (45 to 66 Hz)

18V to 32V ext. DC supply

RS232 Communication

Standard 2804 command set or NMEA (selectable)

Baud rate: 4800bps

Connectors: 2 x 9-pin male DB9

Ethernet Communication

Model 1874A (add-on option): Ethernet Communication port in place of RS232 for alarm and status monitoring and control

Protocol Support ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, SMTP, FTP, DNS, HTTP, Modbus TCP, Modbus ASCII/RTU

RJ45 connector. 10Base-T/100Base-TX Full or half duplex, Auto negotiating

General Specifications

Environmental Data

Operating Temp: 0°C to +50°C

Storage Temp: -40°C to +71°C

Safety: EN 61010-1, EN 60950, CE

EMC: EN 50081-1, EN50081-2, CE

Dimensions and Weight

Width x Height x Depth:

483 x 44 x 350 mm (19" x 1¾" x 13¾")

Weight: 3.8 kg

Ordering Information

2804: GPS Master Clock, OCXO, 10 MHz, 5 MHz, 1-pps, time code outputs, event input, alarm output, RS232

Included with shipment

Mains cable

User manual on CD

18 months warranty

Built in options

Option 12: User programmable digital synthesiser

Option 13/10: 5 x additional 10 MHz outputs

Option 13/05: 5 x additional 5 MHz outputs

Option 13/01: 5 x additional 1-pps outputs

Oscillators

Option 14: Rubidium oscillator in place of Quartz

Communication options

Model 1874A: RS232 to Ethernet converter + digital input/output

Other options

Option 95/03: Extended warranty to 3 years (instead of 18 months)

Option 95/05: Extended warranty to 5 years (instead of 18 months)

Specifications subject to change without notice

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- Experts in time & frequency calibration,
measurement and analysis