GPS-12RG
GLONASS/GPS-Controlled Rubidium Frequency Standard

DATA SHEET

- GLONASS and GPS-disciplined Rubidium clock for near-Cesium stability
- Frequency and timing outputs are traceable to both GPS and GLONASS
- Use of both GLONASS and GPS gives better signal coverage
- Internal battery option for ultimate stability during transportation and mains-free field use
- 5 & 10 MHz outputs standard for metrology use
- 1-pps timing output
- 1.544 or 2.048 MHz outputs for telecom applications

Very High Stability

The GPS-12RG is a very precise GLONASS- and GPS-controlled Rubidium reference clock for various telecom and metrology applications. In its standard configuration, the 10 MHz or 5MHz outputs provides a calibration reference and a reference for other measurement instruments in the lab or in the test rack.

The combined use of both GLONASS and GPS received signals, improves the geographic coverage and leads to a better signal reception also in urban areas, and for field use. Its telecom outputs can be set to either 1.544 MHz (T1) or 2.048 MHz (E1) reference clock outputs, for calibration or synchronization of telecom test instruments and network elements.

The 1-pps output provides an ultra-stable timing reference, with excellent hold-over specifications (less than 1μs after 24 h hold-over). This is useful in applications where timing is critical, like synchronization of DAB, DVB or WCDMA transmitters or for synchronization of radar antenna array systems.

Optional Configurations

The GPS-12RG is equipped with both metrology and telecom clock frequencies as standard. There are three 10 MHz and one 5MHz outputs, plus two user selectable front-panel telecom outputs (1.544 MHz/T1 or 2.048 MHz/E1), plus a 1-pps (1-pulse-persecond) output. There are also additional optional output frequency possibilities like extra 1, 5 and 10 MHz outputs or extra telecom outputs of 2.048/1.544 MHz and 2.048/1.544 Mbps.

The Pendulum GPS-12RG Portable Reference clock is an ultra-stable GLONASS and GPS-disciplined Rubidium reference, targeted for both laboratory and telecommunications applications. When locked to GLONASS and/or GPS, its near-Cesium performance makes the GPS-12RG an ideal calibrator for metrology and test systems.

Truly Portable

The GPS-12RG is compact, lightweight and has an internal battery option to maintain stability during transportation or to allow field use without access to AC mains for over 2 hours. It is now possible to transport an atomic frequency standard into the field and have instant access to the full stability, with zero warm-up time.

The GPS-12RG provides a portable reference clock for ALL kinds of instrumentation. It can also be used as a permanent ultra-stable inhouse frequency reference for R&D, test systems, or manufacturing.

Flexible and Easy-to-Use

Its configurable alarm outputs give urgent or non-urgent alarms for hardware failures, loss of Rubidium oscillator lock, entering Holdover mode, and more. User settings and display are selectable for six languages. The GPS-12RG is an excellent metrology reference for calibration of test equipment such as Wandermeters, SDH/SONET network analyzers, and general test and measurement equipment time bases.

Distribution systems

The GPS-12RG can be used with Pendulum distribution amplifier systems, to distribute the ultra-stable reference from GPS-12RG. The DA-35 and DA-36 distribute the reference signal via optical fibers over long distances (up to 2km) to other rooms, floors or even buildings. This fiber distribution is free from electromagnetic noise pick-up and ground current loops.
Standard Outputs
(Allan dev.), at temp. 20°C to 26°C:
<2×10⁻¹² (τ = 24 h), locked to GPS
<5×10⁻¹⁰ (τ = 100 s)
<1.7×10⁻¹¹ (τ = 10 s)
<5×10⁻¹³ (τ = 1s)
Phase noise: -140 dBc/Hz @10 kHz offset
Warm up (+25°C): 10 minutes to 1×10⁻⁷ (typ.)

Frequency stability - Hold-over
Aging/month: <5×10⁻¹¹
Temp. (0°C to 50°C): <1×10⁻¹⁰

Standard Outputs
1.544 MHz or 2.048 MHz (2 front-panel outputs, user selectable)
Connectors: BNC female (2)
Frequency: 1.544 MHz (T1) or 2.048 MHz (E1) square wave, user selectable on the front panel
Output level: -1.2 V to +1.2 V ±10% in 75 W (G.703:10)
3x 10 MHz and 1x 5MHz (rear panel)
Connector: BNC female
Output level: Sine wave, >1Vrms in 50 Ω load
1pps (front-panel output)
Connector: BNC female
Output level: approx. 0V to +2.0 V in 50 W load
Duty cycle: approx. 20% (GPS-locked)
Jitter (GPS-locked): <1ns rms
Hold-over accuracy: approx. 1μs drift after 1 day of Hold-over
Alarm output (rear)
Signal coding:
Relay open: alarm mode;
Relay closed: normal mode:
1 urgent output;
1 non-urgent output
Max switching voltage: 60 VDC
Max switching current: 200 mA

GPS Antenna Input (rear)
Connector: Type ’N’, female
DC Antenna Supply: +5VDC, center-pin positive, through ‘N’ connector

Options Available
Option 70B outputs
Frequency: 3x 10 MHz, 1x 5MHz
Output level: Sine wave, >1Vrms in 50 Ω
Option 71B outputs
Frequency: 0.1, 1, 5, 10 MHz
Output level: Sine wave, >1Vrms in 50 Ω
Option 72B Outputs
2x 2.048 MHz and 2x 2.048 Mbps outputs (G.703)
Output level: -1.2V to +1.2V +10% in 75 Ω

Option 74B Outputs
2x 1.544 MHz and 2x 1.544 Mbps outputs (G.703)
Output level: -1.2V to +1.2V +10% in 75 Ω

Option 78/HS
Internal rechargeable NiMH battery for GPS-12RG. Includes additional inlet for +12 VDC external power supply/charging
Operation time: 2h
Stand-by time: 2.5h
Ext. +12 VDC inlet: +10.5 to +18 V, 5A
Option 79/01
1x External 1 PPS disciplining input (TTL-levels in 50 Ω)
1x 1 PPS output (TTL-levels in 50 Ω)
2x 10 MHz outputs (1Vrms sine)

Environmental
Temperature:
0°C to +50°C (operating);
-40°C to +70°C (storage);
Internal temperature controlled fan
Safety: Compliant to CE: EN 61010-1 2nd edition, Cat II, Pollution degree 2
EMI: Compliant to CE: EN 61326-1 (1997)

Power Supply
Line voltage:
100 V to 240 Vrms (±10%);
50 Hz to 400 Hz (±10%);
<60 W during warm-up,
<35 W during normal operation
Optional external DC supply:
+12 V nominal (+10.5 to +18 V), 5A (option 78/HS)
Internal Battery:
Via internal NiMH battery, capacity 45 Wh, 12 VDC connector for charging and continuous operation (option 78/HS)
Freq. Stability: <2×10⁻¹² when switching between any power source; AC MAINS, internal battery, or external +12 VDC.
Line voltage:
100 V to 240 Vrms (±10%);
50 Hz to 400 Hz (±10%)
<60 W during warm-up,
<35 W during normal operation

Mechanical Data
Width x Height x Depth:
210 x 108 x 395 mm
(8.25” x 3.6” x 15.6”)
Weight:
Net: 3.1 kg (6.6 lbs); excl batteries
Shipping: 4.1 kg (8.8 lbs); excl batteries

Ordering Information
Basic Model
GPS-12RG:
Glonass/GPS-controlled Rubidium Frequency
Standard with 3x 10 MHz, 1x 5MHz, 1x 1pps, and 2x 1.544 MHz or 2.048 MHz outputs
Included with Instrument:
User manual on CD
Calibration certifi cate
18 months warranty

Built-In Options
Option 70B: 3x 10 MHz plus 1x 5MHz extra outputs, sine, 1Vrms
Option 71B: Multiple reference outputs 0.1/1/5/10 MHz, sine, 1Vrms
Option 72B: 2x 2.048 MHz and 2x 2.048 Mbps outputs (G.703)
Option 74B: 2x 1.544 MHz and 2x 1.544 Mbps outputs (G.703)
Option 78/HS: Internal Battery and external +12 VDC power supply inlet
Option 79/01: 1x ext. 1 PPS disciplining input, 1x1 PPS out, 2x 10 MHz sine out

Optional Accessories
Option 01/90: GNSS antenna, 40 dB gain, N connector, includes mounting kit
Option 22/90: 19” rack mount kit
Option 27: Soft carrying case
Option 90/07: Heavy-duty transport case
Option 90/00: GPS-12 Monitor, Control and Monitoring SW (via USB)
Option 27/12: GPS-12 Monitor, Control and Monitoring SW (via USB)
Option 29/12: GPS-12 Monitor, Control and Monitoring SW (via USB)

Optional Options
Ordering Information
OM-12: Printed Users Manual (PDF-file is included as standard)