SyncSystem 4380A
Master Timing Reference

Summary

The SyncSystem 4380A provides superior time and frequency performance in a highly configurable 1U rack-mountable package. The combination of a high-performance internal atomic oscillator and L1/L2 GPS receiver ensures accurate synchronization of the system with UTC (USNO) while still providing the excellent phase noise and short-term stability demanded by metrology, aerospace, communications and defense applications.

Key Features

- Timing accuracy: <10 ns RMS
- Frequency accuracy: <1E–13 at 1 day
- L1/L2 GPS receiver mitigates effect of ionospheric delay changes and supports advanced GPS processing
- Phase noise: –110 dBc/Hz (1 Hz offset)
- Hot-swappable timing modules
- Redundant and hot-swappable power supplies
- SSHv2 network management console
- Remote software upgradeable
- External frequency reference input enables augmented timing performance when higher stability frequency standard is available

Configurable and Scalable

The 4380A is well suited to satisfy your current timing needs and provide the scalability to meet future requirements. Each 4380A has six expansion ports for hot-swappable user timing modules that provide a wide array of timing signals.

Internal XPRO Oscillator

Included in the 4380A is Microchip's XPRO, which is the highest performing rubidium oscillator in the industry. The XPRO leverages over 35 years of proven rubidium atomic physics with advanced digital electronics architecture to provide an exceptionally stable oscillator that meets the most demanding performance requirements. Great care has been taken in the design of the XPRO for long operating periods without maintenance. With a 5.0×10^{-11} per month aging, the oscillator will maintain 1.0×10^{-9} frequency accuracy for 10 years or longer without recalibration.

Enhanced Timing Performance

Although the 4380A already employs an internal rubidium oscillator, the unit also has the ability to use an external frequency reference (for example, 5071A or MHM 2010 Hydrogen Maser) when available. This further enhances the performance of the 4380A without requiring additional upgrades.

Positioning Data

Recognizing that timing is often just one component of your overall solution, positioning data from the internal L1/L2 GPS receiver is also provided to users. GPS measurement data can either be logged to internal memory for subsequent downloading and post-processing or output in real-time through the Ethernet port.

The 4380A has the ability to produce a Receiver Independent Exchange (RINEX) file that allows users to post-process the GPS observations and determine the antenna position to typically under one centimeter.

Remote Monitoring and Control

A GB Ethernet interface allows users to remotely monitor and control the unit as well as upgrade the system software and firmware. Local management is also available through the use of a RS-232 adapter or a local USB ports.

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Specifications

Timing Performance

- Time accuracy: <10 ns RMS
- Frequency accuracy: 1E–13 at 1 day
- Temperature stability: 3E–10 (0℃ to 50℃)
- Aging: 5E–11/month
- Allan deviation (GPS locked)
    - 1s   6E–13
    - 10s   8E–13
    - 100s   8E–13
    - 1,000s   6E–13
    - 10,000s   6E–13
    - 100,000s   1E–13
- Phase noise (4395B-10)
    - 1 Hz   –110 dBc/Hz
    - 10 Hz   –132 dBc/Hz
    - 100 Hz   –145 dBc/Hz
    - 1 kHz   –150 dBc/Hz
    - 10 kHz   –155 dBc/Hz
    - 100 kHz   –155 dBc/Hz
    - 1 MHz   –155 dBc/Hz
- Mechanical/environmental
    - Size: 1.75" (h) × 19.00" (w) × 19.00" (d)
    - Weight: 20 lbs (9.1 kg)
    - Operating temperature: 0℃ to 50℃
    - Humidity: 0% to 95% non-condensing
    - Power: 55 Watts
- Timing Modules
    - 4334A: Epoch pulse output card
    - 4337A: AM IRIG epoch card
    - 4338A: 4-epoch AM IRIG card
    - 4374A: 4-port T1/E1 card (RJ-45)
    - 4376A: 4-port RS422 PPS output (DB-15)
    - 4383A: 4-port IRIG input card
    - 4387A: AM IRIG
    - 4393A: 4-channel PPS measurement card
    - 4394A: PPS/DC IRIG output module
    - 4395B-1: 1 MHz output module
    - 4395B-5: 5 MHz output module
    - 4395B-10: 10 MHz output module
    - 4396A: 4-port E1 clock (50 Ω)
    - 4397A: 4-port E1 HDB3 (50 Ω)
    - Optional Accessories
    - 90000-L1L2: Inline GPS signal amplifier, L1/L2
    - 90240-TT30: Antenna cable, LMR-240, 30 m, TNC(M)-TNC(M)
    - 92003: GNSS antenna included
    - 94000-115200: RS-232 console interface (115,200 bps) included
    - 94001-5071A: 5071A serial converter (9600 bps)

Standard Input/Output Signals

- GPS input
    - Connector: TNC(F)
    - Antenna voltage: 0, 5 VDC or 12 VDC (selectable)
- 10 MHz input
    - Connector: BNC(F)
    - Level: 10 dBm ±3 dB
    - Impedance: 50Ω
    - Format: sine wave
- Serial
    - Connector: DB9(M) (USB to serial adapter provided)
    - Format: RS-232
    - Baud: 115,200 (others available upon request)
- Network interface
    - Connector: RJ-45
    - Interface: 10/100/1000 BASE-T
- 4385A—AC power input module (2 included)
    - Connector: IEC 60320 C-14 Inlet
    - Voltage: 100 VAC–240 VAC, 45 Hz–65 Hz
- 4386A—DC power input module (optional, requires DC option in chassis)
    - Connector: 3-pin (mating connector: AMP #1-350346-0)
    - Voltage: 22 VDC–60 VDC
- Pulse output modules (optional) PPS (default configuration)
    - Outputs: 2
    - Connector: BNC(F)
    - Level: >2.4V high, <0.8V low (into 50Ω)
    - Pulse width: 100 µs ±10%
    - Rise time: <2 ns
    - Jitter: <100 ps
- DC IRIG (default configuration)
    - Outputs: 2
    - Connector: BNC(F)
    - Format: A, B, D, E, F, G, H
    - Level: >2.4V high, <0.8V low (into 50Ω)
- Sinewave output modules (optional)
    - Outputs: 4
    - Connector: BNC(F)
    - Level: 13 dBm ±2 dB
    - Format: sine wave
    - Harmonics: <–40 dBc
    - Impedance: 50Ω
- AM IRIG output modules (optional)
    - Outputs: 4
    - Connector: BNC(F)
    - Format: A, B, D, E, F, G, H, NASA36
    - Level: 2.8 V$_{PP}$, 3.5 V$_{PP}$, or 6 V$_{PP}$ (into 50Ω)
    - Modulation ratio: 10:3

For More Information

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