brandywine communications

GPS 8

GPS SYNCHRONIZED TIME AND FREQUENCY STANDARD

- Frequency Accuracy of $1x10^{-12}$
- Choice of Disciplined Oscillator
- Very Stable Time & Frequency outputs
- Optional P(Y) code GPS receiver
- 1U 19" rack mount
- Timing Accuracy 40ns, rms to UTC
- 1PPS and IRIG B Time Code outputs
- Two Serial Ports
- 1 MHz, 5 MHz or 10 MHz sine waves
- 1.544, 2.048 or 19.6608 MHz outputs

The GPS is an economical and reliable Time and Frequency instrument offering a wide range of standard features in a compact, IU rack-mount chassis. Precision time and frequency outputs, accurate to 40 nano- seconds to UTC/USNO and $1x10^{-12}$ respectively, are provided in a variety of signal formats.

Applications for the popular GPS8 include central time and frequency systems, timing for power utility systems, and frequency standards for a wide variety of communications installations. The IRIG B output is perfect for use in range timing installations, as inputs to SER and SCADA systems and for driving remote time displays. 1PPM and 1PPD or IRIG B DC shift may be selected for output.

A variety of internal oscillators, including the standard TCXO, provide price/performance trade-off possibilities for the user. The GPS 8 can be specified to include an oscillator that is appropriate for almost any application. An advanced oscillator control algorithm precisely disciplines the internal oscillator to the GPS input ensuring superior holdover performance. In addition to the standard TCXO, a variety of oven controlled (OCXO) and Rubidium oscillators are optionally available.

Two serial data ports, RS-422 and RS-232 are provided. Time, date, position, GPS satellite health and signal strength are reported.

A precision 1PPS time mark output may be used for synchronizing or calibrating other equipment.

The serial time code output (IRIG B is standard) allows time synchronization to be distributed to computers, displays, and other equipment requiring precise time.

Two square waves, 1.544, 2.048 or 19.6608 MHz, and an 8 kPPS frame rate enable the GPS 8 to be used as a telecommunications primary reference clock (PRC).

Sine waves of 1, 5 or 10 MHz are also available. The sine wave outputs are configured as two pairs of two of the above frequencies. Signal level integrity monitoring is provided for the sine wave outputs.

Status information is provided over the serial interface, by a summary alarm, and by four front panel LED indicators. The status reported by the summary alarm and the serial interface includes loss of GPS signal, PLL unlock, loss of output, and Rubidium oscillator unlock. (The rubidium oscillator is an optional feature)

2230 South Fairview Street ●Santa Ana, CA 92704 ● 714-755-1050 phone ● 714-755-0175 fax
www.brandywinecomm.com info@brandywinecomm.com

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GPS 8 Specifications

1 PPS Output

Connector	BNC
Amplitude & Impedance	0, +5Vdc from 50 Ohms
On Time	Rising Edge
Duty Cycle	50%

Serial Interface

Number of Ports	2
Connector	DB9
Type	RS-232 and/or RS-422[1]
Baud Rate	50-19, 200[1]

Sine Wave Outputs[1]

Number of outputs	Two pairs of 2
Connector	BNC
Frequency (MHz)	1, 5, 10[2] (select when ordering)
Level	1 Vrms into 50 Ohms
Isolation	Transformer

Time Code Output, Modulated Carrier[1]

Number of Outputs	1
Code Format	IRIG B, 2137, NASA 36[1]
Level	3Vpp into 600 Ohms

Digital Time Code & Pulse Rates[1]

Outputs[1]	IRIG B, 1PPM, 1PPD, Programmable Rate
Levels	DC level shift (HCMOS Logic Level)

Telecom Outputs[1]

Frequency	2.048,1.544 or 19.6608 MHz, 2 ea [2]
Output	G703 Section 6 2.37V pulse into 75 Ohms or 3V pulse into 120 Ohms
Frame Rate	8 kPPS, 0v and+5v from 75 Ohms

Summary Alarm

Voltage free relay changeover contacts & TTL level, positive or negative[1]

Environmental-Physical-Power

Temperature	
Instrument	0 to + 50°C
Antenna	-40 to +85°C
Humidity	To 95% non-condensing
Power	95-260 Vac, 19 W warm, 30 W cold [3]
Optional Power	18-36 Vdc, 36-72 Vdc, -48Vdc
Dimensions	19 inch Rack Mount, 1.73 inches high (1U) 15.80 inches depth
Weight	11lb typical
EMC Emission	To EN50081-1 as EN55022
EMC Immunity	To EN50082-1 as EN1000-4-2 ESD, IEC 801-3 HF Field, IEC 801-4 Burst
MTBF	159,769 Hours per Mil 217F, Notice 2, 25 degrees C, ground benign

GPS Specification

Satellite Signal	GPS L_1 1575.42 MHz
Satellite Code	C/A 1.023 MHz
Receiver Type	Parallel 12 Channel, 12 Satellites tracked continuously and simultaneously
Position Accuracy	2.4 m horizontal, 5 m altitude with respect to WGS-84 after 24 hours of position averaging
Warm start	<20 seconds
Autonomous Start	<120 seconds
Cold Start, Automatic	No input of time or position is required
Antenna & 100' cable	Included at no extra cost.
Dynamic Operation	Specify Dynamic Mode at time of order[2]

Timing Accuracy

Tracking satellites	±150 nS. absolute to UTC*
	Std Deviation 34 nS (Osc.-03)
	Hourly mean 25 nS (Osc.-03)
Holdover Mode	<8 µsec/day (Osc.-03),
	1 µsec/day (Osc.-04)

Frequency Stability

While Tracking satellites — See table below

OSC TYPE	STABILITY 0-50°C	AVERAGING TIME 1 SEC	10 SEC	100 SEC	1K SEC	10K SEC	1 DAY
TCXO	$1X10^{-6}$	$1X10^{-9}$	$2X10^{-9}$	$2X10^{-8}$	$5X10^{-10}$	$6X10^{-11}$	$1X10^{-12}$
OCXO	$5X10^{-8}$	$5X10^{-10}$	$3X10^{-10}$	$4X10^{-10}$	$4X10^{-10}$	$5X10^{-11}$	$1X10^{-12}$
HSOCXO	$5X10^{-9}$	$2X10^{-12}$	$3X10^{-12}$	$1X10^{-11}$	$1X10^{-11}$	$5X10^{-12}$	$1X10^{-12}$
Rb	$2X10^{-10}$	$6X10^{-12}$	$9X10^{-12}$	$1X10^{-12}$	$1X10^{-12}$	$1X10^{-12}$	$8X10^{-13}$

SSB Phase Noise

(Data taken with HSOCXO option installed)

1Hz	-90 dBc
10Hz	-120 dBc
100 Hz	-135 dBc
1000 Hz	-140 dBc

ORDERING INFORMATION

GPS 8 OPTION	-AA MODEL	-BB OSC	-CC SINEWAV E (A)	-DD SINEWAV E (B)	-EE TIMECODE	-FF TELCO	-GG SERIAL	-HH POWER
00	STD C/A		2 ea 10MHz	2 ea 10MHz	IRIG B	2 ea 1.544 PULSE	2 ea RS-232	115/230 Vac
01		TCXO (STD)	2 ea 5MHz	2 ea 5MHz		2 ea 2.048 PULSE	2 ea RS-422	24Vdc
02	STD P(Y)	OCXO	2ea 1MHz	2 ea 1MHz	NASA 36		1 ea RS-232 1 ea RS-422	-48Vdc
03		HI STAB OCXO	2 ea TELCO	2 ea TELCO	XR3			125Vdc
04		Rb			2137			

GPS8 Plus model

Adds keypad and digital display

* 100ns without selective availability implemented

Note 1 User Selectable, Telecom outputs may be used to provide 1, 5 or 10 MHz TTL outputs. Consult sales office

Note 2 Factory Set

Note 3 With HSOCXO option

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