

Patented Smart GXCllok-500

Auto-Adaptive GPS/GNSS SmarTiming+® Technology

The GXCllok-500 is a smart, low cost, compact and fully integrated GPS/GNSS receiver & crystal oscillator module. It uses the adaptive SmarTiming+ technology, disciplining the GPS/GNSS reference noise at 1ns resolution, providing a host of complex time and frequency features in one package, while achieving state-of-the-art performance, reliability and extended lifetime.



Applications

Telecom | Navigation | Broadcast | Defense | Instrument

Key Features

- Low aging in holdover mode
- Low g sensitivity options available
- Frequency offset over temperature
- Integrated GPS/GNSS receiver
- SmarTiming+ GPS/GNSS disciplining technology
- Short-term stability
- Output frequency accuracy/stability:
 - PRS/Stratum 1 locked
 - Holdover (no GPS/GNSS/PRS)
- Output time accuracy/stability:
 - GPS locked
- Small volume
- Single power supply
- Communication & control

: $\pm 3E-10$ / day

: $< 2E-10^*$

: MMCX input connector (1575.42MHz signal from GPS/GNSS antenna)

: 1ns resolution

: $< 2E-12$ @ 1s

: typical $\pm 1E-12$ (avg 24 hrs)

: $< 10\mu s$ / 24hrs

: $< 50ns$

: 3.6 inch³ (3x0.8x1.5" / 76*20*38 mm)

: 12V

: RS232 interface (9600 b/s)

NMEA 0183 messages (standard \$GPRMC and \$GPZDA)



* For any 10°C temperature change within the full operating range

SPECIFICATIONS

ELECTRICAL

Spec	Smart GXClock-500	
Type	Standard	Options
RFOUT Frequency	10 MHz	Not applicable
Frequency Change Operating temperature range (Thermal chamber with air flow)	≤6E-9 -10°C to +70°C	-40°C to +85°C (order code : E85)
Frequency Accuracy locked to GPS		+/- 1E-12 (24h avg)
Frequency Accuracy when not locked to GPS		+/- 3E-10 (24h avg)
Aging (After 3 months of continuous operation)	± 3E-10 / day	(order code: A) ± 1E-10 / day
Short Term Stability 1sec	5E-12	(order code: S) 2E-12
Phase Noise (dBc/Hz) (RFOUT=10MHz)		
1 Hz		-95
10 Hz		-120
100 Hz		-140
1k Hz		-145
10K Hz		-150
Frequency Retrace Off/On (In stable temperature, gravity, pressure & magnetic field conditions)		< 1E-8 24 hrs / 15 minutes
Warm-up Time @ +25°C Frequency Stability		< 7 minutes < 1E-7
Frequency accuracy when locked to GPS signals		< 3 E-12
Digital Frequency Adjustment Internal crystal oscillator freq. Resolution (Through RS-232 commands)		>±4E-7 divided in 65536 steps < 2E-11 / step
RFOUT SINE Outputs Output impedance Harmonics Spurious FO ± 100kHz	3 floating sine waves, 0.5 Vrms (± 10% / 50Ω) 50 Ω ±20% < -25dBc < -80dBc	(order code: NF) No floating
RFOUT TTL Output level		0-5V (10mA sink/source)
RFOUT LVDS Differential Output voltage magnitude Steady-state common-mode output voltage		Typ. 340 mV / 100Ω Typ. 1.2V
Communication Interface Protocol speed		RS-232 control & monitoring (see commands below) 9600, n, 8, 1
Supply Voltage (DC)		12V (11.7V to 12.9V)
Max Power Supply Ripple		< 50 mV peak to peak (from 1Hz to 1 MHz frequency band)
Input Current Warm up @+25°C (typical) +25°C		< 700 mA < 250 mA
Conformal coating	None	Included (order code: CC)
Reverse Voltage Protection		< -40V (up to -40V on power input / no damage)

ENVIRONMENTAL

Spec	Smart GXClock-500	
Type	Standard	Options
Magnetic Field Sensitivity		< 2E-10 / Gauss in worst axis
Storage Temperature		- 55°C to + 85°C
Humidity		GR-CORE-63, Section 5.1.2
Operating Vibration		GR-CORE-63, Section 5.4.2 Random and Sinusoidal MIL-PRF-28800F, Class 3, 4
Shock		Survival: 40g / 11ms
G-Tip-Over Test		< 2E-9 / g in worst axis
Dynamic sensitivity	< 2E-9 / g in worst axis	(order code: g1) < 1E-9 / g in worst axis (order code: g2) < 5E-10 / g in worst axis

PHYSICAL

Spec	Smart GXClock-500
Type	Standard
Volume / Size (L x W x H)	3.6inch3 (3x0.8x1.5" / 76*20*38 mm)
Weight	40g (1.4 oz)
Mounting & Mechanical Layout	See drawings
Connectors	Dual in line 16 pins (2*8) 2mm RFOUT coaxial GPS/GNSS Input coaxial
	Hirose DF11-16DP-2DSA01 3 MMCX (10MHz output each) 1 MMCX straight

INTEGRATED GPS/GNSS RECEIVER WITH SMARTIMING+® DISCIPLINING TECHNOLOGY

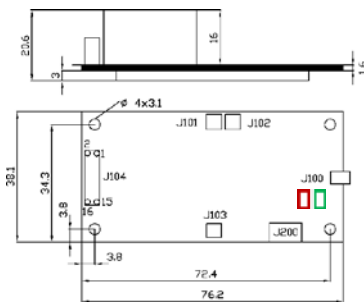
Spec	Smart GXClock-500	
Type	Standard	Options
Integrated GPS/GNSS Receiver	GPS/GNSS	-
GPS/GNSS Antenna Kit Input Cable connector Active antenna voltage Antenna type	None	(order code: PA) MMCX 5V Patch antenna 6 m/19.7' Included
GPS/GNSS Antenna Kit Antenna type Lightning surge protector Cable length	Not applicable	(order code: PA) Patch antenna (order code: RA) Rooftop antenna Not applicable Included ≥5 m/16.4' (order code: CA) 5+15m/16.4'+49'
Antenna mounting bracket	Not applicable	(order code: BRA)
Disciplining mode	Auto-adaptive thru SmarTiming+® technology (request White Paper)	Not applicable
Architecture Model	Sync (phase alignment) or Track (frequency alignment) See Operational Principles below	
GPS/GNSS Receiver Control	Request GPS/GNSS iSync+ Connectivity AppNotes	
T-RAIM @ startup time	Auto-configured, if supported by receiver	Auto-configured
Position hold @ startup time	Auto-configured, if supported by receiver	Auto-configured
PPSOUT TTL Output Level Pulse Width or duty cycle (PW)		1PPS 0-5V (10 mA sink/source) User settable, 0 to 1s in 50ns/step
PPSOUT LVDS Differential Output voltage magnitude Steady-state common-mode output voltage		1PPS Typ. 340 mV / 100Ω Typ. 1.2V
PPSREF Level Pulse width Rising edge GPS/GNSS vs. PPSREF		1PPS IN CMOS 0-5V (< 0.8V, >3.7V) >100 ns, <0.5 sec <20 ns User settable by software
PPSOUT to PPSREF Sync Error Conditions (Sync Mode)		< 50 ns No PPSRef noise, ± 1°C temp fluctuations
PPSOUT to PPSREF (DE) Programmable delay (Track mode)		0 to 1s in 50ns/step
PPSOUT Holdover Time Stability (Under stable temperature conditions)	< 25 μs / 24 hrs	(order code: A) < 10 μs / 24 hrs
Smart Loop Time Constant Phase/Frequency User settable		Auto-adaptive 10 to 10000 sec Sync/Trak mode RS-232 command interface
Communication Interface GPS/GNSS Protocol speed		RS-232 control & monitoring (see commands below) 9600, n, 8, 1

MODEL ORDERING INSTRUCTIONS

GXClock-500 / 10M / xx

Type Frequency Options (S/RA/etc)

MECHANICAL DRAWING



J104 Connector*					
	I/O		I/O		I/O
1	+10MHz LVDS	○	2	-10MHz LVDS	○
3	10MHz TTL	○	4	-1PPS LVDS	○
5	+1PPS LVDS	○	6	GND	I
7	Device OK 0-3V +5k	○	8	RX 232 (0-5V)	I
9	TX RS232 (0-5V)	○	10	1PPS OUT TTL	○
11	1PPSIN C-MOS	I	12	GND	I
13	Alarm Track/Sync 0-3V +5k	○	14	GND	I
15	+12V	I	16	+12V	I

***J104 Mating Connector Supplier:**
 Header PN 1688348 at www.newark.com/hrs-hirose/df11-16dp-2dsa-24/header-2mm-16way-dp/49P5026?Ntt=1688348
 Dual cable PN 1688308 at www.newark.com/hrs-hirose/df11-16ds-2c/wire-to-board-connector-receptacle/dp/49P5027?Ntt=1688308
 End cable crimp tin PN at 1688393 at www.newark.com/hrs-hirose/df11-2428sc/contact-socket-28-24awg-crimp/dp/49P5045?Ntt=1688393
 Crimp tool PN 1688394 at www.newark.com/hrs-hirose/df11-ta2428hc/tool-crimp-df11-awg-24-28/dp/49P5012?Ntt=1688394

TYPICAL PERFORMANCE DATA

